Pit and Quarry

With which is consolidated

CEMENT-MILL & QUARRY

May, 1934

Selfvulc

Saves Replacements

BEFORE

Typical section of conveyor belt worn through to fabric from handling crushed stone

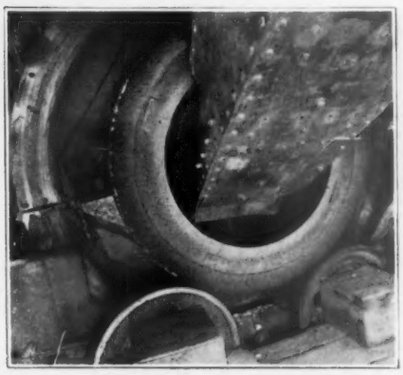
AFTER

Same belt resurfaced with an application of Anti-Abrasion Plastic Rubber Compound—good as new!

THIS SELF-CURING PLASTIC RUBBER COMPOUND shows sensational economies in protecting equipment from abrasion and corrosion.

SELFVULC makes old belts new and doubles their service life. It provides a superdurable covering for metal surfaces that will outlast steel plates.

FOR lining chutes, hoppers, agitators, classifiers, covering pipes, cables and surfaces exposed to wear in flumes, centrifugal pumps, tube mills, dredging equipment, air separators, fans, and any other equipment where abrasion is present. SELFVULC will save thousands of dollars annually in maintenance costs.



CHUTE LINING

Anti-Abrasion Plastic Rubber Compound, used for lining this chute, shows practically no wear after two years' service in handling sand and stone mix

Selfvulc

Write for Details of Special Trial Offer

SELF-VULCANIZING RUBBER COMPANY, INC.

605 West Washington Boulevard — CHICAGO, ILLINOIS

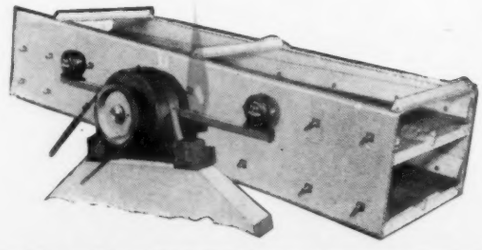
Pages 17-21

Since 1929 the largest net paid A. B. C. producer circulation in the field

AN EXCLUSIVE JIGGER FEATURE . . .

OIL-NOT GREASE-LUBRICATES ALL MOVING PARTS

- **Automatic Lubrication** — The Jigger vibrating screen does not require constant attention. All moving parts operate in bath of oil.
- **Immediate starting** regardless of temperature—no grease to congeal—requires less power.
- **Dust-proof** case means bearings always run clean—longer life—maintenance and repairs are at minimum.
- **Controlled Vibration**—Throw quickly adjusted to suit material, no matter how slightly it may vary—another exclusive JIGGER feature.



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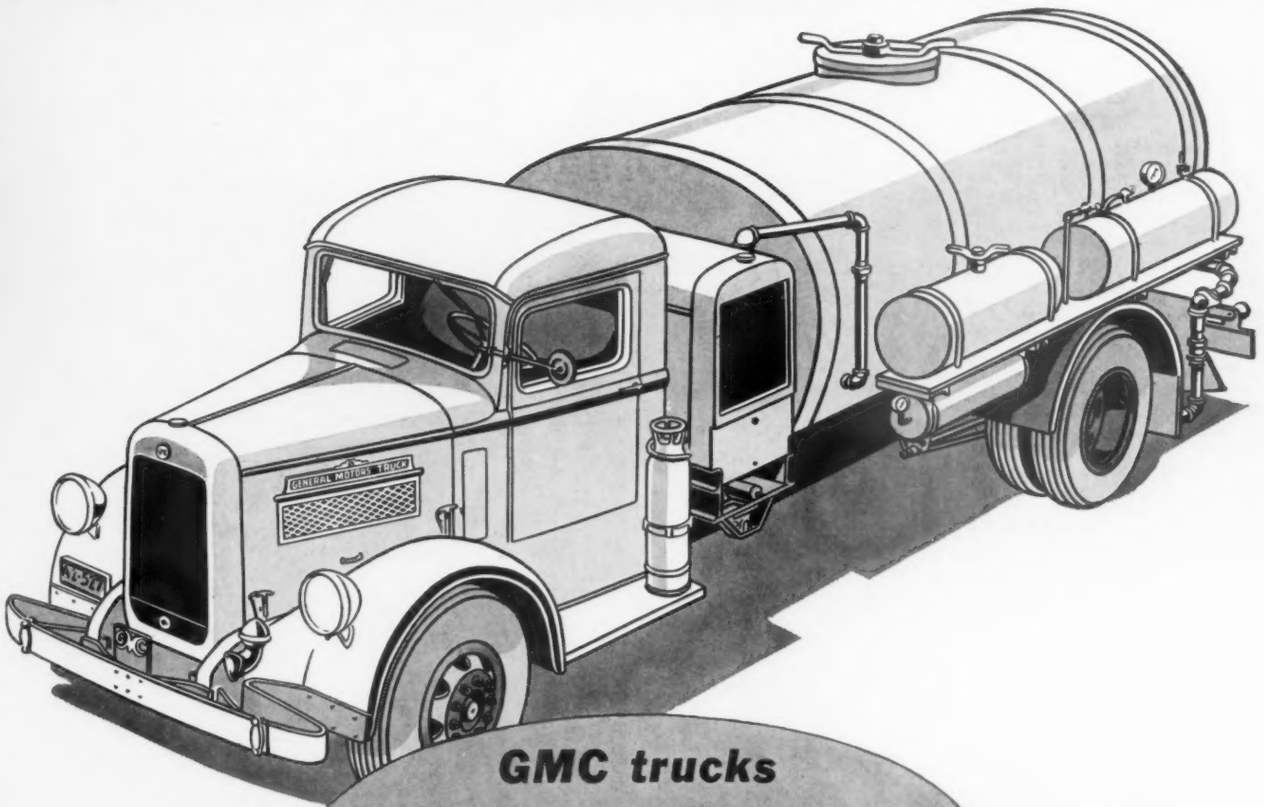
Superior in Design and Construction!

INVISIBLY

Superior in Quality of Materials!



GMC trucks contain the finest material used in heavy duty truck manufacture

In modern design, advanced features of construction—in workmanship and finish—GMC Heavy Duty Trucks are *visibly* superior.

And beneath this *visible* superiority are *invisible but equally important "material" superiorities.* GMC Heavy Duty Trucks are not only *made better,* but they are made of *better materials.*

Chrome-Nickel Blocks—Blocks on the 400 and 450 engines are heat-treated, chrome-nickel-molybdenum *electric furnace steel.* Every 400 and 450 block is Brinnel-tested for proper hardness. Every cylinder head passes the same test.

Chrome-Nickel Exhaust Valves—GMC Heavy Duty engines have exhaust valves of 21% chrome and 12% nickel, and the stems are heat-treated nickel-steel with special hardened tips.

Hardest Cylinder Sleeves Made—GMC engines 525 and up, use the hardest motor truck cylinder sleeves made—Brinnel test 460-512 after heat treatment. All sleeves are hydraulically tested at a pressure of 1500 pounds per square inch, for cracks or sand holes.

Case-Hardened Transmission Gears—Transmission gears are machined from drop-forged blanks, heat-treated to insure a hard, long-wearing surface. 3½% nickel-molybdenum steel is used for toughness.

GMC Heavy Duty Trucks *lead the entire heavy duty truck field in the quality of materials used.* GMC Heavy Duty Trucks are made of better materials—for greater strength, greater resistance to wear, and lower maintenance costs. Ask your GMC dealer.

GENERAL MOTORS TRUCKS and Trailers

GENERAL MOTORS TRUCK COMPANY — Time Payments Available Through Our Own Y. M. A. C. — PONTIAC, MICHIGAN

OCT 19 1934
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Pit and Quarry

With which is consolidated
CEMENT-MILL & QUARRY

Volume 26 May, 1934 Number 11

MEMBER AUDIT BUREAU OF CIRCULATIONS

Published on the first of each month for producers and manufacturers of Cement, Crushed Stone, Gypsum, Lime, Sand, Gravel and other nonmetallic minerals. Entered as second-class matter November 28, 1932, at the Postoffice at Chicago, Ill., under the Act of March 3, 1879.

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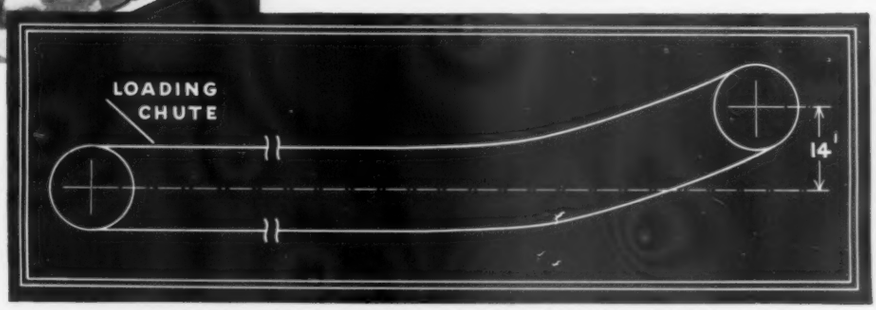
NRA MEMBER U.S. WE DO OUR PART

IN A HOT SPOT FOR 4 YEARS

GOODYEAR HY-TEMP CONVEYOR BELT STILL ON THE JOB HANDLING SLAG

A G.T.M. SPECIFICATION

Record of 406,155 tons to date and Belt is still in working condition



G.T.M. specified Goodyear H-T Conveyor Belt 828', 30"x 5-ply, for Duquesne Slag Products Company, Pittsburgh, Pa.

DUQUESNE Slag Products Company, of Pittsburgh, Pa., points to a veteran conveyor belt in its plant as the best of reasons for standardizing on Goodyear Hy-Temp Belts.

This particular conveyor belt has given Duquesne what the user considers exceptionally good service with a minimum of trouble and at very low cost.

Its job all along has been a real test of belt stamina, too.

G. T. M. RECOMMENDED HY-TEMP

Four years ago last February, Duquesne asked the G. T. M. – Goodyear Technical Man – to analyze their slag conveying installation and submit his recommendations.

As he always does, the G. T. M. made a careful study of the operating conditions. He noted that the belt would be called on to carry slag, frequently at comparatively high temperatures.

The Goodyear Style H-T Conveyor Belt (828 feet long, 30" by 5-ply) which he specified has now handled 406,155 tons in its four years of duty *and is still in fair condition.*

You can have the same efficient, trouble-free, cost-reducing service from your conveyor or power-transmission belts by getting the *right* equipment, accurately specified and scientifically built for your operations.

Why not discuss your requirements for belts and hose with this practical expert who knows rubber and its many uses in industry? He is readily available through Goodyear, Akron, Ohio, or Los Angeles, California, or your nearest Goodyear Mechanical Rubber Goods Distributor.

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HOSE • PACKING
MADE BY THE MAKERS OF GOODYEAR TIRES

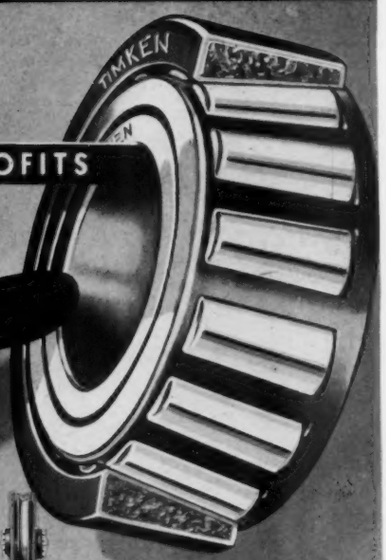
THE GREATEST NAME IN RUBBER

GOODYEAR

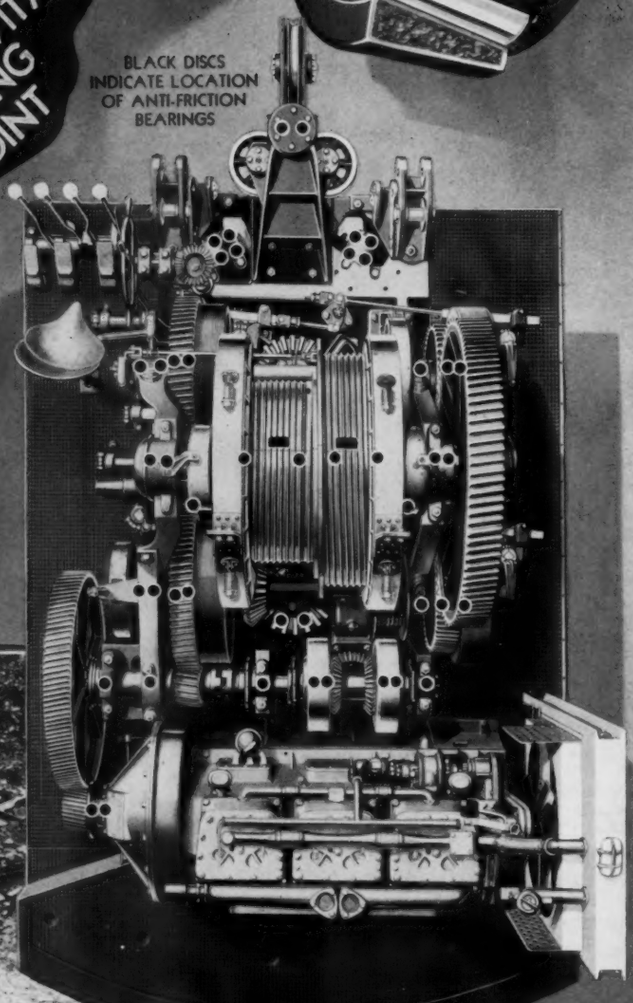
Lima FEATURES
POINT TO GREATER PROFITS

AN EXCLUSIVE LIMA FEATURE

ROLLER BEARINGS AT EVERY VITAL BEARING POINT



BLACK DISCS INDICATE LOCATION OF ANTI-FRICTION BEARINGS



THE great number of roller bearings which are used in LIMA excavators not only conserve power and lengthen the life of the machine, but they also lower maintenance cost by guarding against improper tooth action, destructive chattering and grabbing clutches and annoying end play in the cone rollers and bevel gears.

LIMAS are the most modern and efficient excavators on the market—their distinctive features point to greater profits.

THE OHIO POWER SHOVEL CO., LIMA, OHIO U. S. A.

Division Lima Locomotive Works, Incorporated

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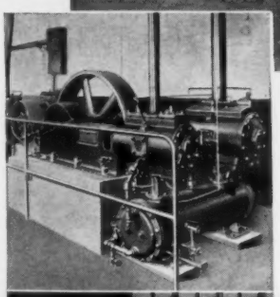
DRAGLINES
CRANES
BACKDIGGERS

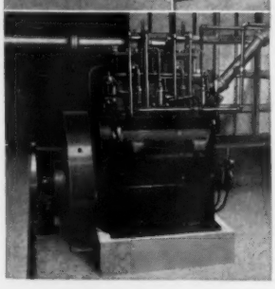
LIMA

¾ YARD
1 YARD
1¼ YARD
1½ YARD
1¾ YARD
CAPACITIES

TYPES 302 - 404 - 502 - 601 - 701

LARGE JOB OR SMALL JOB . . .





EQUIPMENT TO MEET EVERY QUARRY NEED

ROCK DRILLS • COMPRESSORS

A DIESEL OR GAS ENGINE TO DRIVE THE CRUSHING PLANT

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WE DO OUR PART
A-34100-A

And back of them all... **UNDIVIDED RESPONSIBILITY**

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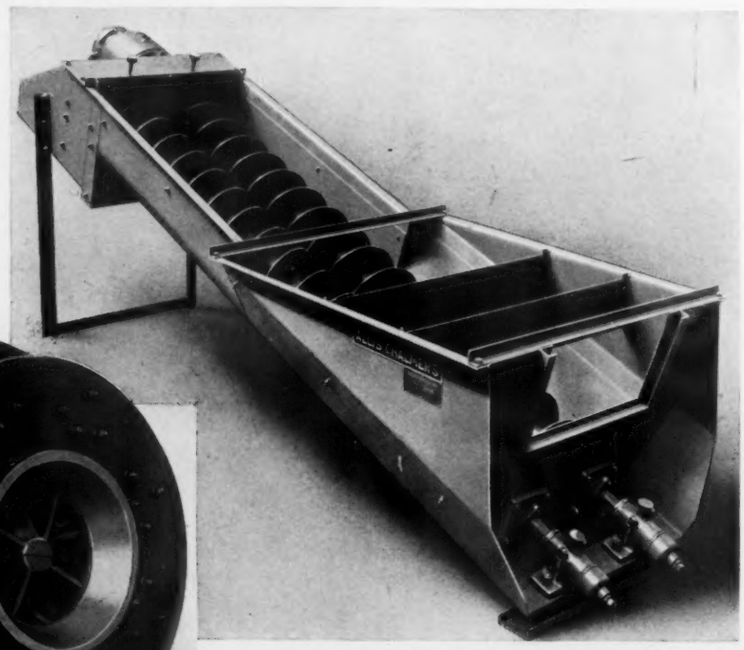
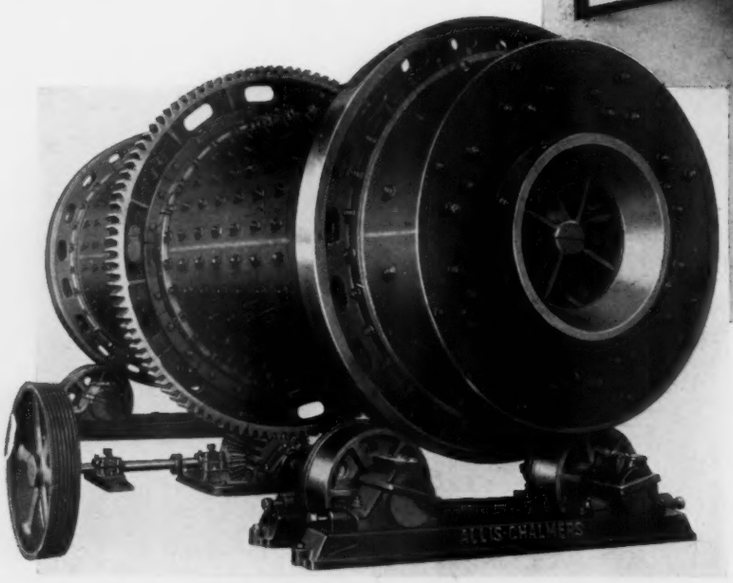
If Washed Aggregates are Necessary

Call on ... Allis-Chalmers



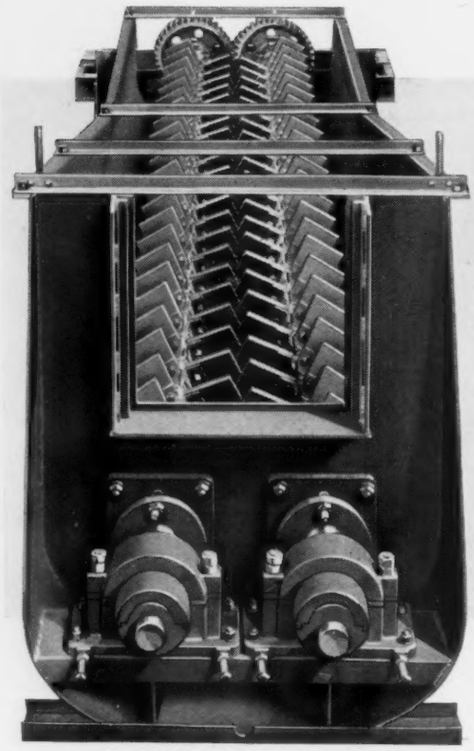
Double Screw Sand Washer with Gearmotor Drive. Washers can also be supplied with sprocket and gear drive.



Revolving Stone Scrubber

THE selection of the proper equipment to produce clean aggregates requires careful consideration, whether it is for a plant which has been operating dry or for a new washing plant. The experience of the Allis-Chalmers Manufacturing Company in the manufacture of equipment required for plants producing commercial aggregates dates from the industry's infancy, and this experience is reflected in the design and application of its products.

Allis-Chalmers builds a complete line of scrubbers, log washers, sand washers, scrubber screens, and vibrating screens, especially designed for washing aggregates. As each has its particular application we suggest you call on our nearest district office for further information.

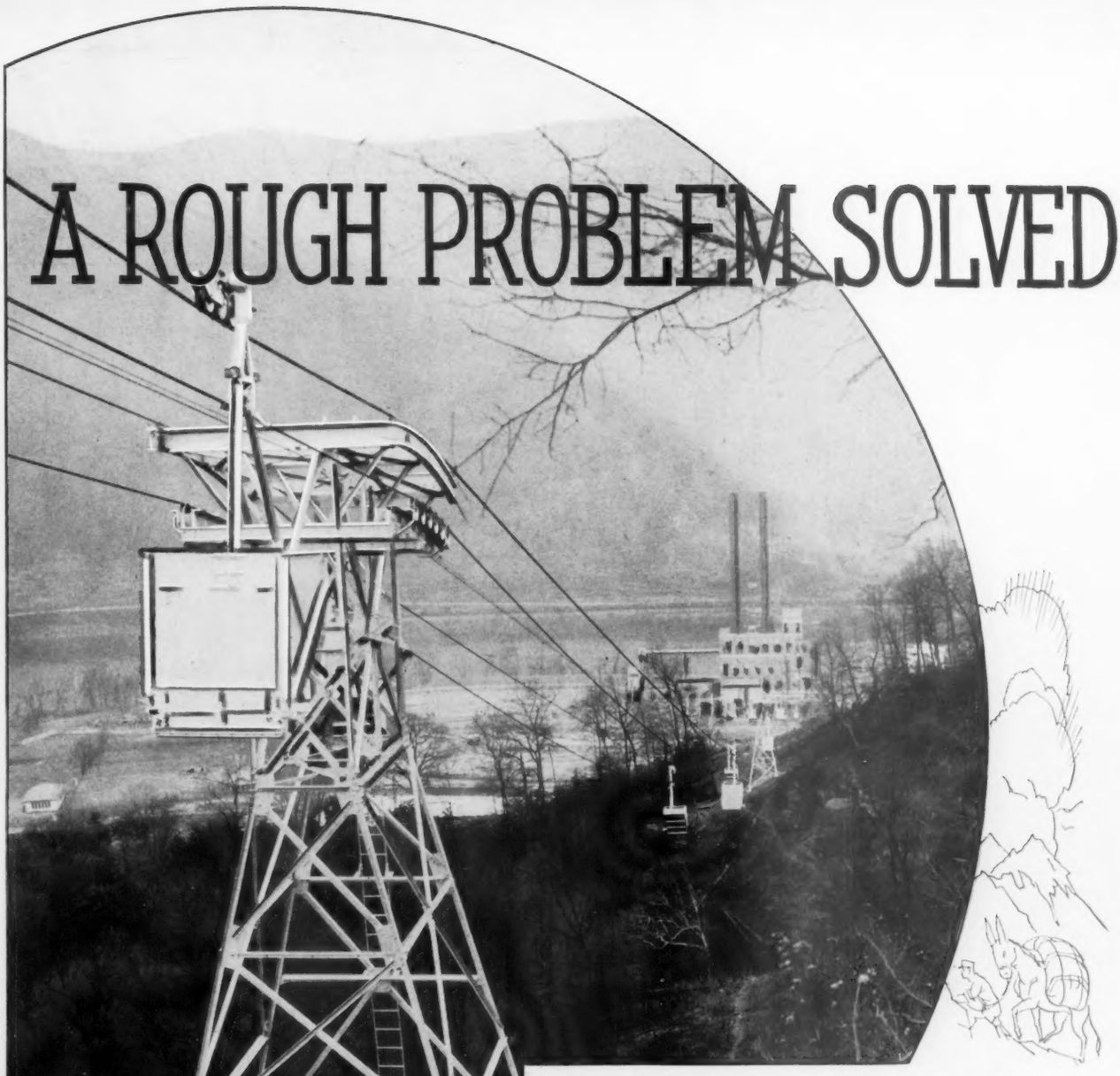


20" x 17' Double Screw Log Washer for stone and gravel.

ALLIS-CHALMERS

Allis-Chalmers Manufacturing Company, Milwaukee

A ROUGH PROBLEM SOLVED



CONQUERED 8800 FEET OF MEAN "UP AND DOWN" COUNTRY

THE illustration shows an example of moving material at a very low cost per ton mile by the use of an American Steel & Wire Company designed, manufactured and completely erected Aerial Tramway. This job is moving 100 tons per hour over nearly a mile and three-quarters of bad terrain. Capacity can be increased to 175 tons hourly by just adding rolling stock. The buckets turn a horizontal angle of 29 degrees automatically, as well as being automatically loaded and discharged. Only one operator is required. Whatever and wherever your transportation problem we will be glad to study it with you.

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SCORES *Again!*

Think of

5 yds. a minute

in a machine costing less than $6000

NEW MODEL 135 has been timed loading 17,400 lbs. of 2″ crushed stone in 63 seconds . . .

•

Bucket 36 in. wide—the biggest ever built for a Loader . . .

•

OIL ENGINE for fuel economy—or 65 H.P., 6 Cyl. Gasoline Motor . . .

•

9′-3″ chute clearance and 7′-5″ reach from bumper to handle your biggest trucks . . .

•

5 yds. capacity KEEPS TRUCKS MOVING—no time lost in the yard . . .

•

Specification details and price quotations on request. Write

GEORGE HAISS MANUFACTURING CO.
142d St. and Rider Ave.
NEW YORK

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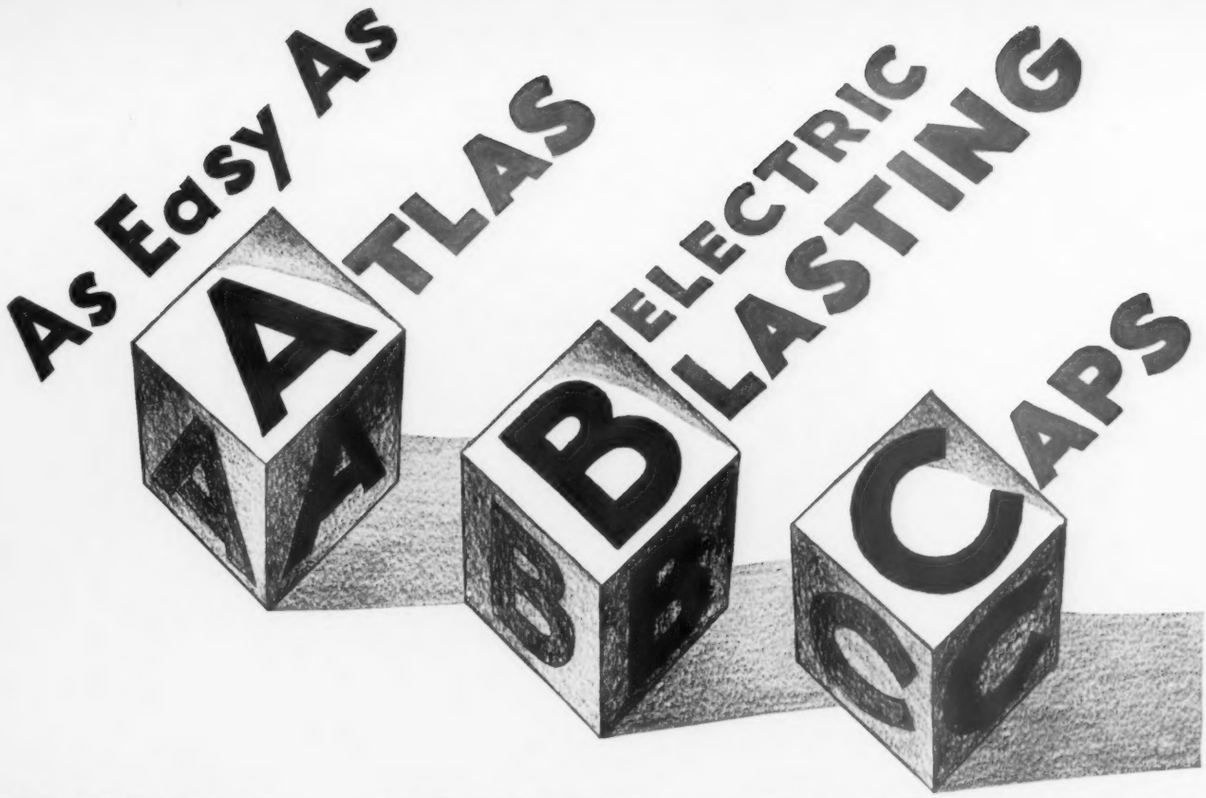
HAISS MODEL 135 LOADER

Builders also of HAISS ELEVATORS & CONVEYORS—ROTARY SCREENS—CLAMSHELL BUCKETS—PORTABLE CONVEYORS



TO CARRY. . . .TO OPEN . . . .TO PRIME IN THE HANDY ACCORDION FOLD

Electric Blasting Caps reach a new high point in convenience and safety through the development of the Atlas Accordion Fold package. Its advantages are tremendous wherever the practical man uses electric firing.

The utmost safety is provided by folding the wires accordion-wise to cushion and protect the electric blasting caps at the sides and ends.

The result is a package handy to carry—easy to open.

The wires extend naturally into position—avoiding tendency to kink or snarl. It is simple to straighten out the cap end for priming without disturbing the rest of the accordion fold.

Atlas Electric Blasting Caps are made to fire dependably. They are built for safety. They are so packaged that their handling is as easy as A B C—and there is no extra cost to you.

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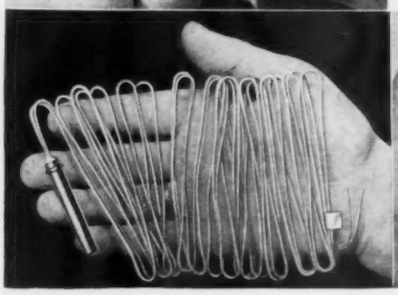
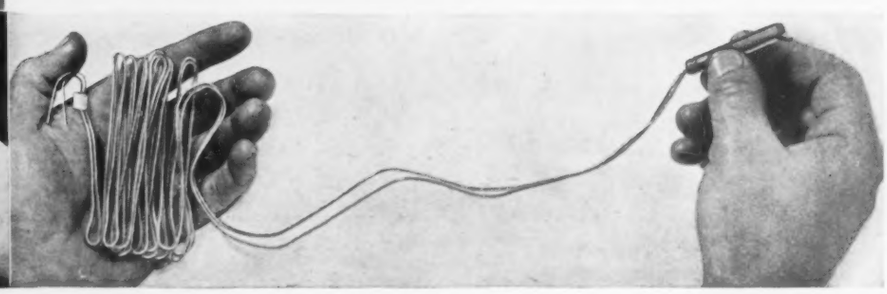
ATLAS EXPLOSIVES





WHY NOT GET THE LATEST "DOPE" ON GRAVEL PLANTS ?

Do you know what the makers of gravel plant machinery have been doing lately . . . what new equipment they have built . . . how this modern equipment has influenced plant layout and production? Such information is worth having . . . whether you are or are not planning to increase capacity or build a new plant. Here are two bulletins that will give you all the "dope."

During the past two years Telsmith engineers have done a lot of research. Engineering facilities have been expanded, too. The result—much new equipment . . . crushers, vibrators, log washers, sand tanks, etc. . . . each piece designed and built to improve the product and cut operating costs.

Why Telsmith engineered plants require fewer mechanical units; illustrations of the units; other interesting, easy-to-read facts are all in the bulletins. Ask for G-15 (Plant Equipment) and No. GB-15 (Plant Layouts), no cost, no obligation.

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TELSMITH

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KG-1

Let's get one Job DONE!

Like working every other day, a little blast—a little digging — a little blast — a little digging — has its disadvantages.

Where practicable, the giant blast is a very profitable investment. It avoids the constant shifting of equipment, and can often supply enough material to keep the shovels busy all summer.

The giant blast requires Cordeau-Bickford Detonating Fuse.

But Cordeau can also be used profitably in smaller hookups. Its use simplifies loading and insures the practically simultaneous detonation of all the holes in the shot. Because the Cordeau is in contact with every cartridge, you get more work out of your explosives — a saving that should interest you.

SAFETY FUSE AND LIGHTERS

Ensign-Bickford Safety Fuse is available in a number of standardized brands, each carefully made for a particular set of conditions. The use of Safety Fuse simplifies blasting technique.

Also—there are a number of Ensign-Bickford lighters, inexpensive—and positive in action.

This book explains Cordeau and shows how to use it. A copy will be sent free to executives.

CB30-A

CORDEAU
DETONATING FUSE
BICKFORD

THE ENSIGN-BICKFORD COMPANY, Simsbury, Connecticut

THE SPIRIT OF ACHIEVEMENT

Thermoid products are engineered with the same SPIRIT OF ACHIEVEMENT *that has perfected the photographic microscope.*

The microscope is marvelously designed. Each lens must be ground with microscopic exactness. Each adjustment must be accurate to a fraction of a hair's breadth. But in this minute attention to detail no greater pains have been taken than in the construction of Thermoid products.

Thermoid beltings, hose and packings are engineering achievements—each one scientifically designed for its individual use. These Thermoid products are subjected to strictest tests under actual working conditions. Only with this background of caution—scientific engineering and painstaking field-testing—is a product considered worthy to bear the Thermoid trade-mark. Look for this guarantee of quality. *And buy by this quality mark!*

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MECHANICAL RUBBER GOODS
QUALITY VALUE SERVICE
NRA

THERMOID RUBBER CO.
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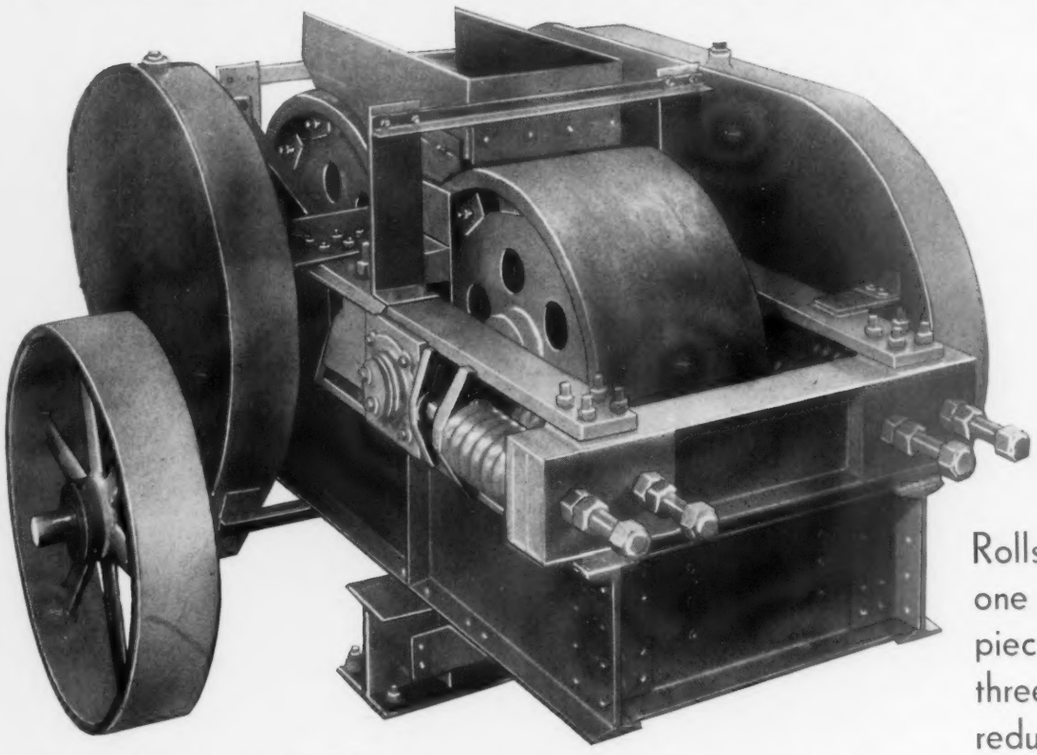
Thermoid
BELTING
HOSE AND PACKINGS

75 TONS HOURLY

3" MINUS TO 1" MINUS WITHOUT EXCESS OF FINES

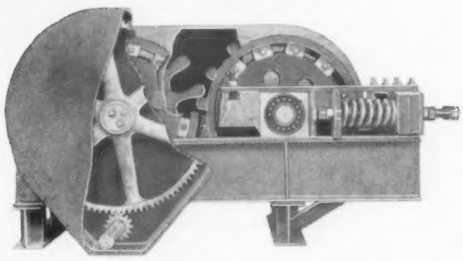


Rolls crush with only one impact on each piece while receiving three inch rocks and reducing them down to one inch. A continuous band of material passes straight through the rolls and is reduced in one crunch from three inches down to one inch in size.

THERE ARE 7 REASONS WHY YOU CAN EXPECT THAT OF THE

PIONEER 40 x 20 ROLLS

1. **Positive Adjustment for Size**—Adjustable back-stop wedges compel positive sizing of material thus eliminating excessive fines.
2. **Gear Driven in Oil**—Pioneer Roll Crushers are driven by 7 to 1 reduction steel cut gears running in a bath of oil. This eliminates expensive shut-downs for replacement and transmits ample power for operating at continuous full load.
3. **Both Rolls Power Driven**—A positive drive to the second roll is provided by Star gears running in oil.
4. **Shells Perfectly Round**—Manganese shells mounted with self-aligning wedges on machined cores are perfectly round.
5. **Anti-Friction Bearings**—Shafer Bearings on the Countershaft and Timken on the Roll shafts.
6. **Built of Quality Materials**—Cut Molybdenum steel gears—Molybdenum steel Star gears—Manganese shells—riveted and welded frame.
7. **Light Weight 16200 Lbs.**—Weighs 50% LESS than other types of reduction crushers of same capacity.



PIONEER ROLLS BUILT IN 4 SIZES

May We Assist You with Your Crushing Problems?

PIONEER GRAVEL EQUIPMENT MFG. CO.

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PIONEER CRUSHERS DO YOUR WORK FASTER—CHEAPER—BETTER

A COMPANION For Your SALES KIT

NOW READY

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—much "deadwood" is there on your prospect lists?
—much do you know about your prospects?
—much do you waste per year on poor lists?
—many "not there" calls do your men make?
—much do you know about new developments?

The pit and quarry industries are more active now than they have been in years. In fact, it's one of the most active fields in industry. It's natural. For before the roads, dams, bridges, buildings, etc., can be built under the public works program the raw material has to be furnished.

Get your share of it. Don't miss fire with poor prospect lists. Don't lose sales because you had "never heard of that fellow before."

These lists are the most complete ever published. They contain hundreds of new names. They have been completely revised—all listings have been brought up to the minute.

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is the wire rope you should choose.

By its process of manufacture—and testing you will find Williamsport more uniform in service. The very close tolerance exacted in our testing laboratories we believe tends to produce longer life in service. A wire rope is only as good as the weakest wires in it and we believe it is poor business to use wires not uniform in strength and other essential characteristics. Because of this we feel you will serve your best interests in using Williamsport.

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Williamsport

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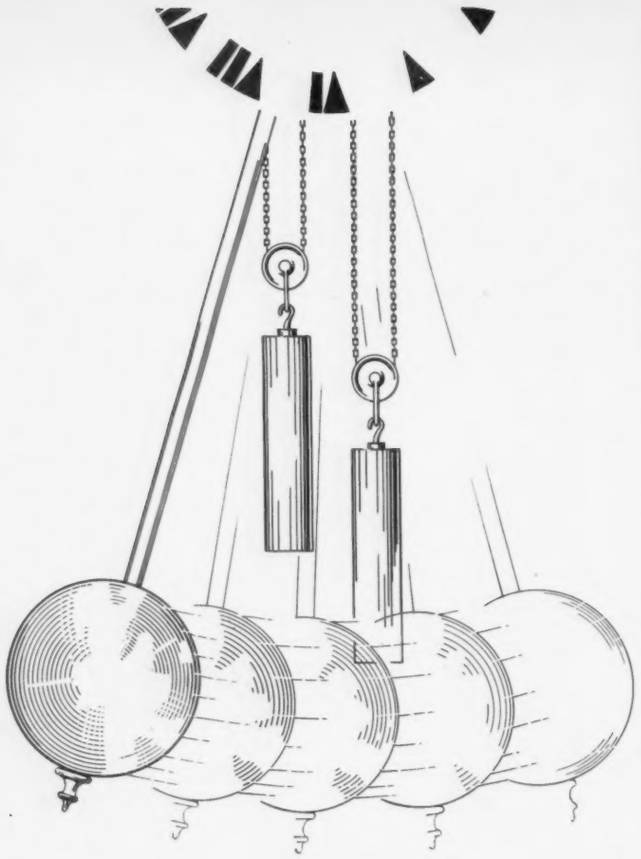
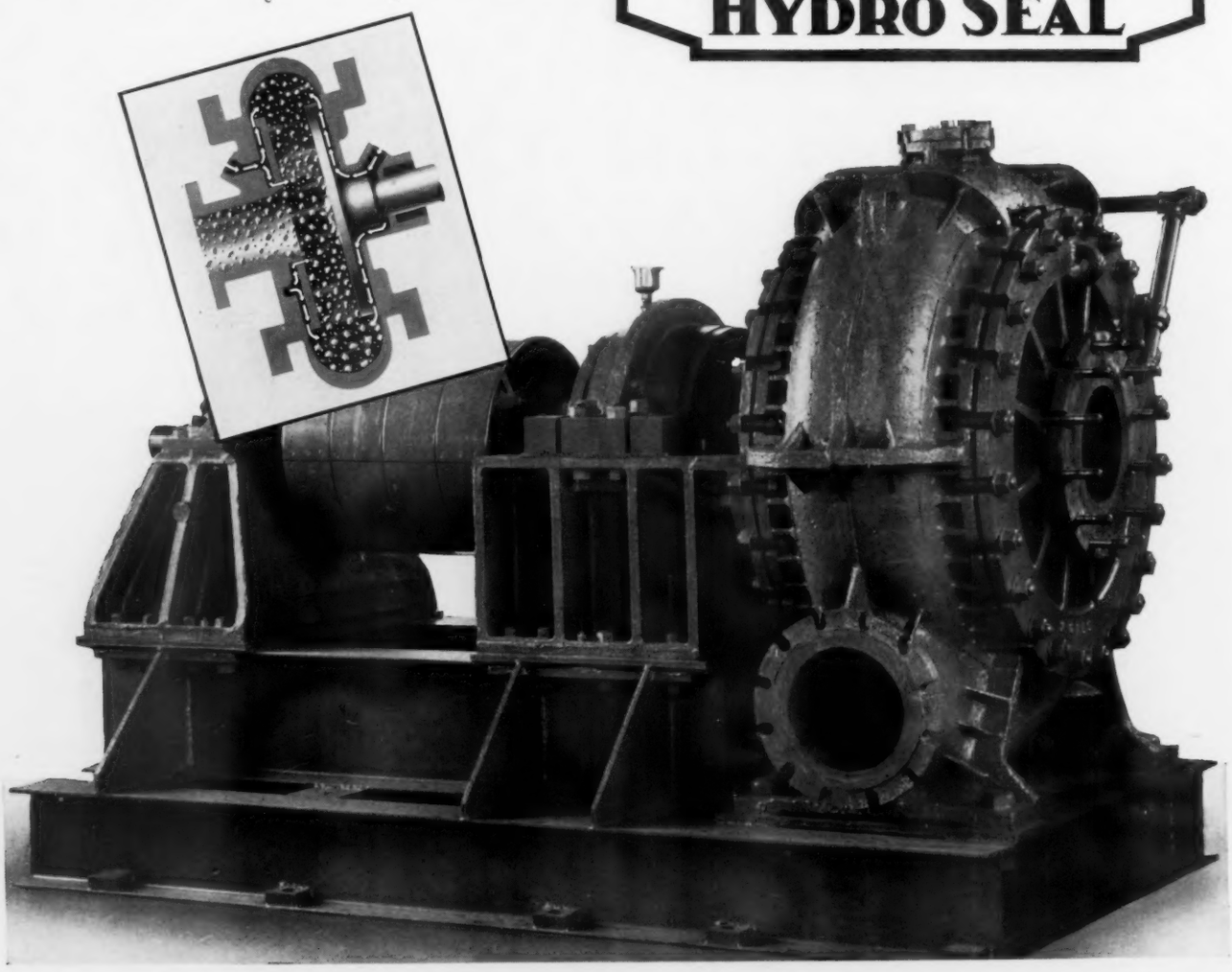
122 So. Michigan Ave.
CHICAGO



Positive as a Pendulum

Clocks operated by weights and chains are world renowned for reliability, since, as long as the weights are set, the pendulum will swing with monotonous uniformity. This same reliability can be obtained with the Hydroseal Dredge Pump . . . As long as the sealing water is correctly supplied (see diagram) abrasive wear cannot occur in the annular clearances between the impeller and pump side plates . . . With no wear at this point, the initial output of the pump cannot help but remain constant throughout its life, and further, it is evident that with wear confined to the inside of the impeller, instead of both sides, maintenance and outage are decidedly reduced . . . Recent improvements make hydrosealing practically foolproof. Let us send you a proposition . . . Give us an opportunity to prove that the Hydroseal Dredge Pump will save you ⅓ in power costs . . . The Allen-Sherman-Hoff Co., 223 South 15th Street, Philadelphia. Offices in Principal Cities.

HYDRO SEAL



VOLUME 26 NUMBER 11

Pit and Quarry

With which is consolidated

CEMENT-MILL & QUARRY

CHICAGO, MAY, 1934

P.W.A. Road Jobs 85% Finished or Under Way

$264,060,000 WORK IN PROGRESS

Progress made on the emergency construction of public-works highways to April 21 under the supervision of the United States Bureau of Public Roads shows that a total of 7,315 projects, estimated to cost $362,822,000, had been advertised for contract, begun by day labor employed directly by the highway authorities, or completed. The cost of the day-labor projects included in the above is estimated at $25,268,000.

Of the 6,645 projects awarded for construction, 4,533 were under construction on April 21 and 1,024 were completed. The work under construction, which is estimated to cost $264,060,000, was giving regular employment to 130,374 men.

In the whole country, work under way and completed involved 85.0 per cent. of the $400,000,000 provided for public-works highways under Sec. 204 of the National Industrial Recovery Act.

Tennessee Gravel Producer Adds Concentrating Tables

★ T. L. Herbert & Sons, Nashville, Tenn., are installing five 7-ft. by 14-ft. Deister Concentrator Co., Deister-Overstrom concentrating tables for washing and removing impurities from gravel. These units are to be installed in a new concrete and steel building which is near completion. Two Deister concentrating tables installed about a year ago are used to handle sand.

Talc and Soapstone Code Approved and in Effect

The Code of Fair Competition for the Talc and Soapstone Industry, which was approved on March 21 and became effective on April 1, applies to all actual producers of talc and soapstone in the country who come under the definition set forth in Sec. 4, Article II of the code.

The organization meeting of the National Assn. of Talc and Soapstone Producers was held at Hotel Pennsylvania in New York on the first three days of August, 1933. At the first meeting a tentative code was drafted after prolonged and vigorous discussion. This was revised several times at numerous subsequent meetings and was finally approved and signed by the Code Committee in Washington on Feb. 15. This committee consisted of E. W. Magnus, vice-president, Eastern Magnesia Talc Co., Burlington, Vt., chairman; Michael Doyle, president, International Pulp Co., Gouverneur, N. Y.; and J. Frazier Glenn, Georgia Talc Co., Asheville, N. C.

The Code Authority will be elected shortly as provided in Sec. 1, Article VI of the code.

The association's roster shows about 40 operators in the United States. These are located in New York, Vermont, Michigan, Wisconsin, Illinois, California, Maryland, Virginia, Pennsylvania, North Carolina, South Carolina and Georgia.

Mr. Doyle is president of the association, and Mr. Magnus is vice-president. J. B. Aikman, assistant treasurer and manager of the Vermont Talc Co., Chester, Vt., is secretary-treasurer. Besides Messrs. Doyle and Magnus, the directors include Grant Huntley, president and general manager, Alberoyd Corp. of America, New York, N. Y.; F. F. Farrar, secretary, Cohutta Talc. Co., Dalton, Ga.; and W. J. Thorn, of Innis, Speiden & Co., New York, N. Y., representing California members.

The approved code provides maximum working hours of 40 in any one week or 8 in any 24-hr. period, subject to a few exceptions for employees engaged in emergency maintenance, watching, etc. Minimum wages are fixed at 40 c. per hr. underground and 35 c. per hr. above ground in the northern zone and at rates 10 c. per hr. lower in the southern zone. Minimum rates for female workers are 80 per cent. of the figures named.

Florida Lime Producer Installs New Equipment

★ The Dixie Lime Products Co., Ocala, Fla., has purchased a Raymond kiln mill for drying and grinding decomposed limestone which has a moisture content of about 20 per cent. A Raymond 9-ft. Cook wet dust collector is also being installed at the company's lime plant at Reddick, Fla.

Asks Ohio to Patronize Registered Producers

AIMED AT GOVERNMENT PLANTS

Two hundred and seventy-five producers—94 of crushed stone, 172 of sand and gravel, and 9 of slag—had been registered for code compliance in Region 8 (Ohio) by April 2.

Under the Ohio Industrial Recovery Act, passed in July, 1933, the aggregates industry's code of fair competition was filed with Gov. George White on Mar. 9 and became binding on all Ohio producers engaged in intrastate commerce. Its provisions are "enforceable under the Ohio State laws and through Ohio courts," according to O. W. L. Coffin, assistant administrator for the Ohio Recovery Act.

In writing to Federal, state, county, municipal and township officials in Ohio on April 4, Claude L. Clark, executive secretary of the 8th Regional Committee, said in part:

"Since the code as approved by President Roosevelt has also been accepted and approved by Governor White, and is now effective and enforceable under Ohio laws, we trust that you as a public official in the State of Ohio, will recognize those having signed to comply with their industry code and that you will coöperate to the extent of purchasing such materials as crushed stone, sand and gravel, and slag only from persons and firms as are shown on the inclosed list of authorized registered producers."

It is felt by producers that every effort should be put forth to discourage the production of aggregates by government agencies.

★ The Weston & Brooker Co., Columbia, S. C., has just completed the installation of a 4-ft. by 10-ft. Allis-Chalmers double-deck vibrating screen at its crushed stone plant at Camak, Ga., for the production of surface-treatment stone.

★ The Brown-Rosenbarger Gravel Co., Indianapolis, Ind., has purchased two Iowa Mfg. Co. one-piece dry-screening plants which are both equipped with double crushing units. One of these plants is already in operation at Frontier, Mich.

Government Hears Plea for Uniform Sale Terms

EXTENDS OPEN-PRICE POLICY

Uniform terms of sale and uniform credit practices for the open-price policy contained in the N. R. A. code of the crushed-stone, sand-and-gravel, and slag industries were discussed at a public hearing in Washington, April 5, at which it was evidenced that the industries are in general agreement on the policies involved.

With the exception of several protests against individual items in the standard proposals, most of which were sent in by mail or telegraph and inserted in the record, and none of which appeared likely to cause much controversy, it was evident that the trade is anxious to carry its open-price policy one step forward under code sanction.

Otho M. Graves, chairman of the industry's code authority, who opened the hearing with a general statement covering the import of the recommendations, made it plain that the industries involved do not intend to standardize prices, but desire uniformity in the methods of sale. No consultation or collusion on questions of price is contemplated, he said, but he expressed the conviction that the effective operation of open-price policy depends upon adherence to uniform rules.

While there were some minor differences in the regulations proposed for some of the 16 regions into which the country is divided for purposes of code administration, these differences being intended to take care of local competitive or other conditions, the general principles in all are identical.

The proposals were submitted by district committees representing the New England states, and Illinois, Indiana, Missouri, Kansas, Oklahoma and California. A representative of each district outlined the recommendations of each of the regions embraced within his district, pointing out to Deputy Administrator C. L. Hickling and his aides the changes from the standard regulations asked and the reasons for so asking.

It is proposed that the rules and regulations become operative within 10 days following their approval by Administrator Hugh S. Johnson. They would be binding upon all producers in the district for which they are adopted and deviation from them would constitute a violation of the code approved by President Roosevelt, Nov. 10, 1933.

In addition to the orthodox statements, descriptions and data set out in all quotations for sales, the following terms are proposed for writing into all sales contracts, except in regions for which modifications, none of them substantial, are made:

Freight Rates.—Prices quoted f.o.b. destination are defined as being f.o.b. the point of origin with freight allowed to the destination and are based on the present or duly authorized freight rate from the plant of the seller, at the aforesaid point of origin, and any subsequent advance or decrease in said freight rate shall increase or decrease the delivered price accordingly.

Payment of Freight Charges.—All freight bills are to be paid by the purchaser. In the event that the seller advances the freight, the purchaser shall make payment for such prepaid freight upon the receipt of an invoice therefor, which shall be rendered by the seller within 48 hr. from the time of such prepayment.

Change of Origin.—The seller reserves the right to ship from other than the designated origin without change of the quoted price.

Invoices.—Invoices shall be rendered by the seller and payments made by the purchaser on the basis of railroad weights when deliveries are made by railway. Invoices for deliveries other than by railway shall be rendered on the basis of just and reasonable weights determined in a manner mutually agreeable to the seller and the purchaser.

Taxes.—All processing, manufacturing and sales taxes becoming effective after the date of this quotation shall be added to the invoices and paid by the purchaser.

Terms of Payment.—Net cash on the 16th day of the month for all deliveries of materials during the preceding month. A discount of 5c. per ton will be allowed the purchaser if payment is made on or before the 15th day of the month for all deliveries of materials made during the preceding month, and no discount shall be allowed after that date. In no case shall a waiver of lien be given by the seller prior to the receipt of full payment of the account for that part of the project for which the waiver is asked.

Financial Responsibility.—If at any time the financial responsibility of the purchaser becomes impaired or unsatisfactory to the seller, the seller reserves the right to require payments in advance, or satisfactory security or guarantee that invoices will be paid promptly when due.

Contingencies.—The purchaser agrees to give the seller shipping instructions a reasonable time before deliveries are to be made, and the seller shall not be responsible for delays in shipping caused by labor difficulties, breakdowns at plants, inability to secure transportation facilities, weather conditions, or other contingencies not under the control of the seller.

Acceptance.—The acceptance of this quotation by the purchaser in writing, within 30 days from its date and when executed by the seller, shall constitute a contract of sale between the purchaser and seller.

In the typical set of regulations proposed the following requirements are set out:

Prices shall be filed with the district committee, based on a net ton of 2,000 lb., prices being f.o.b. at a named point or points, and subject to change only after 5 days' notice.

Each producer is to file plant or storage-yard prices for all materials loaded in trucks, these to be changed only after 5 days' notice.

Producers shall be permitted to reduce their prices, without such filing, to meet prices set by competitors who have given the required 5 days' notice.

Prices must be filed with the committee in writing and time-stamped.

No secret or confidential disclosure of prices which it is proposed to file will be sanctioned.

No change may be filed to become effective so as to apply on any project after bids on that project have been received.

Producers shall file with the district-committee secretary a complete list of all contracts or obligations outstanding upon which deliveries will be made under terms, conditions, or prices other than those made effective by the open-price policy.

Upon notice of violation the district committee shall notify the producer affected and set a hearing date not sooner than 10 days nor later than 15 days from the date of such notice.

Region Eleven Working Under Open-Price Policy

SHIELY ASKS SUPPORT OF CODE

The open-price policy has been approved in every district of Region II (Minnesota, North Dakota and South Dakota) of the stone, gravel and slag industries. Petitions for its adoption, approved by the Regional Committee on Jan. 18, were approved by the Code Authority at Cincinnati Jan. 27. Producers have been urged to file their prices promptly as failure to do so will make it impossible for them to sell material to contractors working on Federal projects.

J. L. Shiely, chairman of the 11th Regional Committee, in referring to the benefits of operation under the code, said:

"It is not enough to set up a list of registered producers and then maintain a take-it-or-leave-it attitude towards producers who are not registered. If the average business man has anything to be thankful for in connection with the code, it is that it gives him an opportunity to meet his competitor and compromise the difficulties which have caused the chaotic conditions in the industry, without being concerned about the possibilities of a violation of Federal statutes. If this attitude will be maintained in all district conferences, and an honest effort and sacrifices made where necessary, the code will bring lasting benefits.

"May I observe at this point that I have been engaged in this business or its related activities for over thirty years, and in that time I have seen the passing of hundreds of concerns whose management was not capable, or whose finances were not sufficient to justify their existence? This mortality will continue to exist regardless of the code, but the concern which does not justify its existence is more liable now to blame the code for any difficulties it encounters, so it is imperative that the substantial business men of the industry do everything possible to maintain an understanding with their competitors in the district in which they operate. Already complaints have been sent directly to Washington, but so far most of these have come from a lack of understanding by the complainant, or from the lack of interest taken by the producers of a district in a producer who may have some skepticism of the organization of a district and its management."

The South Dakota State Committee has already held meetings and passed upon petitions of "permissive" areas for Districts 1 and 2.

Seventy producers in Minnesota have already registered by signing the Certificate of Compliance and filing tonnage affidavits, 11 in North Dakota and 35 in South Dakota.

★ The Sand Drying Co., Charleston, S. C., has completed the rebuilding of its plant which burned down.

Code Organization About Ready in Region Sixteen

ONLY IDAHO NOT YET COMPLETE

Except for the selection of a State Committee for Idaho, the code organization of Region 16 has been completed. The membership of the various committees follows:

REGIONAL COMMITTEE

Crushed Stone:
Porter W. Yett, City Motor Trucking Co., Portland, Ore. (Chairman of committee; member of Code Authority).
John R. Reese, Columbia Contract Co., Portland, Ore., secretary-treasurer.
Howard Toole, Lawler Corp., Butte, Mont.
Marshall Newport, Newport Construction Co., Portland, Ore.
Fred G. Redmon, Yakima, Wash.

Sand and Gravel:
Walter A. Moore, Crosby Lighterage Co., Seattle, Wash.
George F. Jacoby, Helena Sand & Gravel Co., Helena, Mont.
Charles W. Joslin, Joslin & McAllister, Spokane, Wash., vice-chairman.
George W. Gauntlett, Pioneer Sand & Gravel Co., Seattle, Wash. (Member of Code Authority).
Howard F. Puariea, Portland Gravel Co., Portland, Ore.
(George B. Herington is executive secretary of the committee, whose headquarters are in Portland, Ore.)

MONTANA STATE COMMITTEE

Stationary Plants:
George F. Jacoby, Helena Sand & Gravel Co., Helena, Mont. (Chairman of committee).
Cliff McLeod, Livingston, Mont.
C. R. Tintinger, Tintinger Gravel Co., Cascade, Mont.

Portable Plants:
F. E. Collison, Collison & Dolven Co., Billings, Mont.
Buck Helean, Missoula, Mont.
J. L. McLaughlin, J. L. McLaughlin & Co., Great Falls, Mont.

Seventh Member:
Howard Toole, Lawlor Corp., Butte, Mont.

The registered producers of Montana organized District 3 on Feb. 24, elected a District Committee, and adopted open-price rules which were approved by the Regional Committee on March 2. The District Committee is composed of Messrs. Jacoby, Collison and McLaughlin representing crushed-stone producers, and Messrs. Helean, Tintinger and McLeod representing sand-and-gravel producers. Howard Toole is counselor and D. F. Barloga, P. O. Box 123, Helena, Mont., executive secretary.

OREGON STATE COMMITTEE

Stationary Plants:
Porter W. Yett, City Motor Trucking Co., Portland, Ore. (Chairman of committee).
D. L. Carpenter, Ross Island Sand & Gravel Co., Portland, Ore.
F. S. Anunsen, Salem Sand & Gravel Co., Salem, Ore.

Portable Plants:
Arthur Milne, A. Milne Construction Co., Portland, Ore.
Marshall Newport, Newport Construction Co., Portland, Ore.
A. H. Saxton, Saxton & Looney, Corvallis, Ore.

Seventh Member:
Roscoe C. Nelson, Dey, Hampson & Nelson (attorneys), Portland, Ore.

This committee was elected at a meeting of Oregon producers held in Portland on Jan. 11, at which time the committee for District 2 was chosen. This district comprises Oregon and Klickitat, Skomania, Clarke, Cowlitz, and Wahkiakum Counties and that portion of Pacific County south of the north line of Township 10 North W. B. & M. in Washington.

DISTRICT 2 COMMITTEE

Crushed Stone:
John R. Reese, Columbia Contract Co., Portland, Ore.
C. A. Dunn, Dunn & Baker, Klamath Falls, Ore.
J. R. McKy, Eugene Sand & Gravel Co., Eugene, Ore.
D. W. Minsinger, Star Sand Co., Portland, Ore.

Sand and Gravel:
Arthur Lofts, Jr., Lofts & Son, Inc., Hood River, Ore.
S. S. Montague, Portland, Ore. (Chairman of committee).
Howard F. Puariea, Portland Gravel Co., Portland, Ore.
L. E. Croswell, Portland Sand & Gravel Co., Portland, Ore.

This committee, whose office is at 43 S. E. Salmon St., Portland, Ore., has adopted open-price regulations which were approved by the Regional Committee on Feb. 5.

WASHINGTON STATE COMMITTEE

Stationary Plants:
George R. Stirrat, Independent Asphalt Paving Co., Seattle, Wash.
George W. Gauntlett, Pioneer Sand & Gravel Co., Seattle, Wash. (Chairman of committee).
Leo. S. Ross, Sand & Gravel Supply Co., Yakima, Wash.

Portable Plants:
Edwin Neary, Goetz & Brennan, Seattle, Wash.
F. R. Hewett, Spokane, Wash.
Charles W. Joslin, Joslin & McAllister, Spokane, Wash.

Seventh Member:
R. V. Rosenbaum, Gray's Harbor Construction Co., Aberdeen, Wash.

Registered producers of western Washington organized District 2 on Feb. 17, elected a District Committee, and adopted open-price rules which were approved by the Regional Committee on Feb. 21.

DISTRICT 2 COMMITTEE

Crushed Stone:
R. O. Dail, Aberden, Wash.
George R. Stirrat, Independent Asphalt Paving Co., Seattle, Wash.
Edwin Neary, Seattle, Wash.

Sand and Gravel:
J. T. Heffernan, Jr., Glacier Gravel Co., Seattle, Wash. (Chairman of committee).
Frank Brennan, Goetz & Brennan, Seattle, Wash.
Russell E. Lind, Lind Gravel Co., Bellingham, Wash.
(W. J. Howard, executive secretary, has an office in Room 1404, Textile Tower, Seattle, Wash.)

Organization of Idaho can not be completed because too few producers in that state have registered.

★ The Ohio Quartz Co., Jackson, O., has installed an American Air Filter Co. Rotoclone to collect the dust from crushers, elevators, and other equipment in its plant. This unit has a rubber-lined impellor and other wearing parts.

★ The Estill Springs Sand & Gravel Co., Estill Springs, Tenn., recently purchased an 18-ton Porter steam locomotive from the Birmingham Rail & Locomotive Co., Birmingham, Ala.

Illinois Circuit Court Dismisses Silicosis Case

SUIT AGAINST CEMENT COMPANY

The first of the silicosis cases brought against a Portland-cement manufacturer in the Illinois courts came to trial recently before Judge Normoyle of the Circuit Court of Cook County.

Joe Sciarini, a laborer in the Oglesby plant of the Marquette Cement Mfg. Co., brought suit alleging injury to his lungs through silicosis for which damages of $50,000 were asked. The plaintiff was represented by Attorney Sol Andrews, and the defendant by Edward Zimmerman of Zane, Morse, Zimmerman and Norman, Chicago.

Among the medical witnesses who testified for the plaintiff were Dr. Merril H. Jacobs and Dr. Joseph Fisher. On cross examination the defendant's attorney disqualified the witnesses and impeached certain important testimony. Judge Normoyle later found Attorney Andrews in contempt. The Judge took the case from the jury and dismissed it without hearing the evidence and testimony brought by the defendant.

Since the report of the U. S. Public Health Service (Public Health Bulletin No. 176) covering a 3-yr. study of the dust problem in a typical cement plant, it has been felt by some medical authorities that the dust produced in that industry may not predispose workers to silicosis or tuberculosis to the extent formerly believed.

Changes Made in Code Authority for Aggregate

The composition of the Code Authority of the crushed-stone, sand-and-gravel and slag industries has been changed. Except for the following alterations, the list of members is the same as that published on page 30 of the February, 1934, issue of PIT AND QUARRY:

1. Members Chosen at Large:

W. M. Andrews, Union Limestone Co., New Castle, Pa. (Regions 8, 9 and 10.)

2. Trade-Association Representatives:

Russell Rarey, president, National Crushed Stone Assn. (Formerly listed as member-at-large from Regions 8, 9 and 10.)

H. V. Owens, president, National Sand & Gravel Assn. (Formerly listed as member-at-large from Regions 1, 2 and 3.)

C. L. McKenzie, president, National Slag Assn. (Formerly listed as member-at-large from Regions 1, 2 and 3.)

3. Government Representative:

Wilfred B. Putnam, National Recovery Administration. (Succeeds R. E. Plimpton, who resigned Mar. 17.)

Production of Cement Continues to Increase

MANY PLANTS REOPEN IN APRIL

The rate at which cement plants are resuming operation indicates that the industry is considerably encouraged by the increase in cement consumption over last year. The long-awaited opening of spring construction work has come, and producers are increasing production to meet the growing demand. The following plants have gone into operation during the past month: Glens Falls Portland Cement Co., Glens Falls, N. Y.; Dewey Portland Cement Co., Davenport, Ia.; Medusa Portland Cement Co., Bay Bridge, O., and Dixon, Ill.; Monarch Cement Co., Humboldt, Kan.; Oregon Portland Cement Co., Oswego, Ore.; Ash Grove Lime & Portland Cement Co., Chanute, Kan.; Allentown Portland Cement Co., Evansville, Pa.; Lone Star Cement Co. Indiana, Limedale, Ind.; Lone Star Cement Co. Kansas, Bonner Springs, Kan.; Bessemer Limestone & Cement Co., Bessemer, Pa.; Federal Portland Cement Co., Buffalo, N. Y.; Petoskey Portland Cement Co., Petoskey, Mich. The plants of the Cowell Portland Cement Co., Cowell, Cal., and the Northwestern States Portland Cement Co., Mason City, are scheduled to go into operation early in May.

T. V. A. Buys Additional Crushing Plant Equipment

★ The Tennessee Valley Authority has awarded a contract to the Allis-Chalmers Mfg. Co. for two hammer mills for the stone sand plant which is under construction in connection with the new crushed stone plant which will supply aggregate for the construction of the Norris Dam at Norris, Tenn. Two disintegrating mills for the fertilizer plant at Muscle Shoals, Tenn., were also purchased, one from the Stedman Foundry & Machine Works and the other from the C. O. Bartlett & Snow Co.

Government Cement Plant Is a T. V. A. Possibility

The Tennessee Valley Authority is seriously considering a plan for manufacturing its own cement to use in construction of the Norris and other dams in the Tennessee River district.

This became known when Dr. Arthur Morgan, T. V. A. chairman, said that bids already received from cement companies were almost identical. They ranged from $2.06 to $2.10 per barrel, he said.

T. V. A. expects to use between 6,000,000 and 7,000,000 bbl. of cement in the next five years, and on this basis the cost would be between $12,000,000 and $14,000,000.

Dr. Morgan pointed out that a recent report of the Federal Trade Commission said the cement industry is using a price system, similar in some respects to the Pittsburgh-plus system of the steel industry under which the purchaser of steel in San Francisco, for instance, would pay railroad freight charges from Pittsburgh, even if the steel was made in Chicago, or some nearer point. Dr. Morgan said he believed about one-eighth of the price of cement went for freight charges incurred in shipping past other cement plants.

Dr. Morgan believes that with the expenditures of about $250,000 at one of the nitrate plants at Muscle Shoals, T. V. A. could manufacture cement below the prices quoted in recent bids, and transport it cheaply up and down the river to the dam sites.

New Handling Facilities Needed to Meet Demand

★ The Allegheny River Limestone Co., Templeton, Pa., has announced plans for increasing its loading and unloading facilities to take care of the increasing demand for its product. A part of the new equipment, including a derrick boat, has already been delivered to the plant and will be put into operation soon.

Producers in Missouri Fix Permissive Areas

The Missouri State Committee of the Thirteenth Region has completed a survey of the aggregate-production facilities of the state and has set up nine "permissive" areas, which are defined as follows:

Joplin Area.—Newton, Jasper, Barton and Vernon Counties.

Kansas City Area.—Platte, Clay, Ray, Carroll, Lafayette, Johnson, Henry, Cass and Jackson Counties.

St. Joseph Area.—Holt, Andrew, De Kalb, Buchanan, Clinton and Caldwell Counties.

Chillicothe Area.—Gentry, Harrison, Mercer, Grundy, Livingston and Daviess Counties and part of Clinton County.

Blackwater Area.—Saline, Pettis, Cooper, Howard, Randolph, Boone, Callaway and Moniteau Counties and parts of Benton, Miller, Cole, Osage and Chariton Counties.

Springfield Area.—Green County.

Hannibal Area.—Clark, Lewis, Marion, Rall, Pile, Audrian, Monroe, Lincoln and Shelby Counties.

St. Louis Area.—Montgomery, Warren, St. Charles, St. Louis, Jefferson and St. Francois Counties and parts of Gasxonade and Franklin Counties.

Cape Girardeau Area.—Dunklin, Pemiscott, Madrid, Mississippi, Stoddard, Butler and Scott Counties and parts of Ripley, Bolinger, Cape Girardeau, Perry and St. Genevieve Counties.

Loses Its Blue Eagle for Violation of Code

PAID LESS THAN MINIMUM WAGES

The Fletcher Lime Stone Co., Fletcher, N. C., producer of crushed stone and lime, has been ordered to surrender its Blue Eagle because of alleged violation of the code of fair competition for the lime industry by paying substantially less than the minimum wage required by the code. Such practice, the Compliance Board complains, "gives the respondent an unfair competitive advantage in the industry." The board voted unanimously to instruct the trade-practice branch to have government agencies notified regarding the alleged violations of the code and also recommended that the complaint be transmitted to the Department of Justice.

Portable Gravel Plant Established in Lansing

The Portable Gravel Co., Inc., Lansing, Mich., which was recently organized, has purchased a portable gravel plant and will soon begin operations on a number of gravel contracts for highway work, mostly in the northern part of the state. R. G. Bogue is president of the company, C. F. Harper is treasurer and L. W. Wright is secretary.

Dewey Cement Plants' Employees Form Unions

According to Grover Berryhill, president of the employees' union at the plant of the Dewey Portland Cement Co., Dewey, Okla., this union, organized for collective bargaining, now has a membership of more than 125, or about 75 per cent., of those eligible for membership. Labor officials are said to believe that this union will lead to widespread unionization of the cement industry. Since this union was organized a similar union with 163 charter members has been organized at the Dewey plant at Davenport, Ia. It is also reported that similar unions have been formed or are in process of formation at other cement plants.

★ The Rust Engineering Co., Pittsburgh, Pa., has received a contract from the Tennessee Valley Authority for the construction of a chimney at the new Nitrate Plant No. 2 at Muscle Shoals, Ala. The contract calls for a reinforced concrete chimney 200 ft. in height above the foundation and with a 10-ft. inside diameter at the top.

★ The Matthiesen Gravel Co., Brentwood, L. I., N. Y., recently installed a 4-ft. by 10-ft. Productive Equipment Co. Jigger vibrating screen.

1934 Pit and Quarry Handbook Now Ready

DIRECTORY LISTS 5,004 PLANTS

The 1934 edition of PIT AND QUARRY Handbook is now being distributed.

As in previous editions, the work of revision has been thorough. Important changes have been made in the sections on Excavating and Loading; Crushing and Grinding (which contains new material on Grindability, Closed-Circuit Grinding, and Air Separation); Elevating and Conveying; Screening, Classifying and Washing; Burning and Cooling; Dust Collection; Packing and Loading for Shipment; and Internal-Combustion Engines. A new section, dealing with Portable Aggregate Plants, has been added.

The new book is larger than the 1933 edition. The Directory portion alone contains 235 pages and lists 629 more plants than the 1933 book.

Florida Gravel Producer Using New Diesel Dredge

★ The Florida Gravel Co., Chattahoochee, Fla., has just put into operation a new sand and gravel dredge with an 8-in. Morris centrifugal dredge pump which is driven by a 100-hp. Cooper-Bessemer Diesel engine. This engine also drives all other equipment on the boat and the paddle wheels which propel it from one deposit to another. A Niagara vibrating screen is used for gravel separation on this dredge.

P.W.A. Bidders Must Show Bids of Subcontractors

The Federal Emergency Administration of Public Works has issued the following order covering the provisions to be inserted in all calls for bids and bid proposals on public-works projects:

Every contractor who bids upon a project financed in whole or in part by loans or grants from the P. W. A. shall submit in a sealed envelope with his bid to the contracting authority the names of all subcontractors and their bids upon which his bid is based. The sealed envelope so submitted shall have on it the name of the contractor with the words thereon "Bids of Subcontractors." Such submission shall be deemed to constitute on acceptance by the contractor, if awarded the contract, of the bid of each subcontractor. Any alteration therein, after the award of the contract, shall be subject to the approval of the P. W. A. engineer.

HAROLD L. ICKES,
Administrator.

The above statement was issued as a general order April 9, 1934, "to all Federal departments and construction agencies," with the following change in the last sentence:

"Any alteration therein, after the award of the contract, shall be subject to the approval of the contracting officer of the Federal department or agency concerned."

This order was issued in order to check a common practice on the part of contractors of shopping among subcontractors after the opening of bids.

Extensive Additions Made to Illinois Lime Plant

★ A Stephens-Adamson 4 ft. by 6 ft. triple-deck, heavy-duty vibrator screen has just been installed in the Marblehead Lime Co. plant near Quincy, Ill. One of the new Redler continuous-flow conveyors has also been put into service to carry bulk lime both horizontally and up a steep incline. The conveyor consists of an enclosed steel trough through which a light skeleton conveying element causes the lime to flow in a solid column.

Japanese Cement Makers Gain in Peruvian Market

Japanese exporters of cement are strengthening their hold on the Peruvian market, according to the U. S. Dept. of Commerce. During the first half of 1933 Peru imported 3,896 metric tons of cement, of which Japan shipped 1,234 tons or 32 per cent. The total imports for the full year of 1932 amounted to 9,148 tons, of which Japan supplied only 357 tons, or approximately 4 per cent.

The increased share of Japan was obtained at the expense of Denmark, Germany, and the United Kingdom. The United States participates only to an insignificant extent in the cement business in Peru. Cement production in Peru is confined to one plant located near Lima which has a maximum capacity of 1,750 bbl.

Montana Cement Plant Adding Storage Silos

★ The Three Forks Portland Cement Co., is enlarging the cement-storage capacity of its plant at Trident, Mont., by the addition of new storage silos. These silos are being constructed of reinforced concrete and when completed about July 1 will have a storage capacity of 100,000 bbl. About 40 men are now being employed to recondition the plant which it is expected will be reopened at an early date.

Stone Producer Expands Building-Supply Business

The Franklin Limestone Co., Nashville, Tenn., last fall was appointed an agent of the Barrett Co. in that city. It has recently installed a complete roofing department and a modern sheet-metal shop. This company is a leading producer of crushed stone and also deals in a complete line of building materials.

1934 First Quarter Fars Exceeds 1933 Contract

MARCH 3 TIMES FEBRUARY

March contracts for construction of all descriptions amounted to $179,161,500; this was almost twice the total reported for February and about three times the volume of March, 1933, according to F. W. Dodge Corp. Increases over both the previous month and March of last year were scored in each of the four principal classes of construction.

For the first quarter of 1934 contracts totaled $462,341,500 as contrasted with only $196,026,800 in the corresponding quarter of 1933. For residential building the gain over 1933 to date amounted to about 46 per cent.; for non-residential building the increase was almost 85 per cent.; for public works the 1934 volume was more than 3½ times the size of the 1933 total; while for public utilities the first quarter's total was about 2½ times as great as in the corresponding period of 1933.

Contracts awarded in March showed gains over February in each of the thirteen Dodge districts except Southern Michigan, where a relatively unimportant decline was reported. Gains over March, 1933, were universal throughout the 13 districts. Likewise, for the initial quarter of 1934 contracts showed gains over the corresponding quarter of 1933 in each of the 13 districts without exception.

The Dodge bulletin states: "During the second quarter of 1933 contracts for all classes of construction in the 37 states as a whole totaled $236,086,600. For the second quarter of 1934, contracts in the same territory should exceed $375,000,000 by a fair margin. Of the contract volume for the second quarter of the current year it is probable that at least 70 per cent. of the total will represent publicly-financed undertakings. During the initial quarter of the year this class of work, totaling almost 350 millions, represented 75 per cent. of the contract total."

The National Slag Assn., of which H. J. Love is manager, announces that after May 1 its offices will be located in the Earle Bldg., Washington, D. C. The old address was the Leader Bldg., Cleveland, O.

★ The new sand plant of the Modern Sand & Gravel Co., St. Louis, Mo., has just been completed. This plant was erected at a cost of over $150,000.00 and has a capacity of about 50 cars daily.

★ The National Lime & Stone Co., Findlay, O., has installed a Symons Bros. vibrating screen in its crushed stone plant in that city.

Editorials

Noncommercial Production

FOR years the tendency on the part of government to encroach upon what has been considered the field of private enterprise has been increasing. Long before the coming of industrial control in America, as exemplified by the present administration's plans for a regulated economy, many important social functions, which might have been and in many cases were left to private initiative, had been assumed by government. With such precedents established and with public opinion to a large extent won over to a belief in government operation it was only to be expected that the movement would gain momentum and would extend itself into new fields. Under the emergency of the present period what was perhaps little more than a drift has become a drive and we find ourselves torn between a tacit acceptance of certain well-rooted forms of government ownership to which we have become accustomed and the compulsory acceptance of new and sometimes astonishing proposals which have lately been placed before us.

In our own industries the drift toward a greater usurpation of private activities by public agencies has been especially noticeable. The fact that road-building and road-maintenance activities have been under government control has made the step from road-material purchase to road-material production seem not only easy but natural. As a result the production of aggregates by government agencies became the fixed policy of many government departments and within the last few years has grown to such huge proportions as seriously to threaten the stability of the established aggregates-producing industries. Had the business slump of 1929-1933 not come, the extension of government activity in this direction might not have been so apparent, nor might it have spread so rapidly. But, coming at a time when the normal private outlets for their products were greatly curtailed and when even public outlets contracted under the pressure of shrinking taxes, this widening of government production has had devastating effects on those industries.

Although statistics of noncommercial production of aggregates have been available only in late years and although they are not complete for any one year, they provide the basis for a reasonably safe appraisal of this form of production. In 1928 the total reported production of sand and gravel by both commercial and noncommercial operations amounted to 209,118,808 tons, of which 9,599,231 tons was noncommercial production, or about 4.5 per cent. In the following year, when production reached an all-time "peak" of 222,571,905 tons, noncommercial production amounted to 16,353,171 tons, or 7.3 per cent. From this point on production continued to decline until, in 1932, it had fallen to 120,037,897 tons, of which 34,748,821 tons, or 28.9 per cent., was the output of noncommercial operations. Thus, while the commercial production of sand and gravel fell from 206,218,734 tons in 1929 to 85,289,076 tons in 1932, noncommercial production rose from 9,599,231 to 34,748,821 tons and its relative importance in the total production increased from 4.5 to 28.9 per cent., or more than six times. The record of crushed-stone production is similar, although it does not exhibit the same degree of change.

Much of the gain in the relative importance of the noncommercial production of both crushed-stone and sand and gravel must be attributed to the improvement in collecting production data from noncommercial sources. Although the 1932 figures are probably not complete, they reflect more nearly the true state of affairs than those of former years. In any event they disclose the extent to which government, especially in the production of sand and gravel, has taken over what was formerly almost exclusively private enterprise. When one considers the fact that this important shift occurred in the absence of any concerted or centralized effort on the part of government, one may well wonder what might occur if government were to adopt public aggregates production as a fixed policy.

As there is every reason to believe that the drift toward increased production by noncommercial operations will increase, even in the absence of encouragement, commercial producers of aggregates can not afford to remain either indifferent or inactive. Already in a few parts of the country the importance of the situation has been realized and steps have been taken to enlist the sympathetic understanding and practical help of public officials. We believe this is logically the first move to be taken in any campaign to relieve the situation. But more important, it seems to us, is the opportunity for obtaining the coöperation of the Federal government. If the government is sufficiently interested in the welfare of the aggregates industries to approve a code embodying provisions designed to prevent the entrance of new commercial producers into the field and to prevent the increase of existing commercial production facilities, why may not it with equal reason, equal justice and equal effectiveness seek to prevent the same kind of destructive competition on the part of government agencies? If it can require that all the materials furnished for use on government-financed projects be produced under N. R. A. conditions, surely it can demand as much of its sources of aggregates supply, whether these be privately or publicly owned. If government aggregates-producing agencies were to produce their output under the conditions of hours and wages of labor imposed upon commercial producers, much of the unfairness of government competition would be removed.

There is apparently no reason, other than a deference to the wishes of local politicians, why the Federal government should not go even farther and

forbid the use of government-produced aggregates on government projects. Such action would not trespass on any well-defined rights, either public or private, and certainly would not exceed, in the exercise of police power, many other governmental acts originated or condoned by the administration.

Since the objectives of the National Industrial Recovery Act are directed quite as much to the preservation of business enterprise as to the relief of unemployment and the improvement of the general good, an appeal for government help in protecting the aggregates industries should not fall on deaf ears. There is every reason why the government should listen attentively to such a plea and should devise means for affording relief.

A Plea for Sincerity

IN their attitude toward the economic and social proposals of the government many people have arrived at that stage of reaction which may be described most tersely, and perhaps also most accurately, by the word "hysterical." Following the long period of initial public enthusiasm and earnest longing, inspired and for a time sustained by the promise of each "new deal" measure, has come a sudden let-down, caused largely by the inability of most persons to maintain for any great length of time an ardent belief or interest in anything. Among people accustomed to watching and appraising a kaleidoscopic train of events and forced, by the rapid sequence of those events, to take what is almost a moment-to-moment view of their importance and effects we should not look for either poise or long-range thinking. Blowing alternately hot and cold is one of the characteristics of this mental instability, and when people are compelled to consider successively a great number of ideas which they have never before even conceived, we must not show astonishment or impatience if their reaction is more emotional than intelligent.

Our newspapers are contributing unduly to the creation and continuance of this unstable state of mind. Existing for the avowed purpose of recording events as they transpire, they have taken upon themselves the function of interpreting those events according to standards of their own and for purposes which they themselves best understand. To say that, on the whole, their interpretations are not conceived with the view of serving public interest is to understate rather than to overstate the problem. Unfortunately few readers realize the nature and exent of this bias with the result that "opinions" expressed in newspaper editorial columns are mouthed about from person to person until they become what is supposed to be "public opinion." This desire to shape public opinion along the lines of selfish interest as conceived by the newspapers has found its most subtle expression in their news columns, wherein the reporting of events is regularly colored and often deliberately distorted to create the erroneous impressions on which they hope to erect an approving sentiment.

The attitude of certain big-city newspapers toward the government's plans for relieving unemployment and assisting in the recovery of business supplies some of the most glaring examples of this sort of commercial proselytism. After deploring for years the absence of intelligence in the administration of public office these papers now refer contemptuously to the President's expert advisers as "brain trusters," giving the impression that they are opposed to the employment of expert advice in matters of state, whereas they are actually only in disagreement with the political views of those experts. Knowing the average man's high regard for the common sense that is supposed to have been so generally diffused among mankind and knowing, too, the average so-called "practical" man's suspicion of those who use their minds more than their hands, they enlarge upon the theoretical aspects of the government's proposals and point out the great differences between these and the wise doctrines of our forefathers. What they can not successfully refute with logic and factual demonstration they attempt to kill with ridicule. And after having condemned the Washington professors on the sole charge of being professors, they employ other professors having contrary views to defend the policies which they have initiated but can not support.

The same lack of sincerity, the same lack of regard for the common good, characterizes the attitude of these newspapers toward all other phases of the "new deal." The reportorial and editorial handling of the Wirt charges, proposed state laws for the administration of N.R.A. affairs, non-compliance prosecutions, and the like discloses the same desire to mislead and to confuse. It is evident in all these various manifestations of self-aggrandizement that many newspapers are inherently incapable of placing public good above private interest and unworthy of the naïve confidence with which large sections of the people look upon them. Intellectual sincerity—we should really say intellectual honesty—becomes more common as we move downward in the scale of newspaper size, disregard of and indifference to the general good varying almost in direct proportion to the amount of commercial advertising patronage.

This subservience to self-interest is a natural phenomenon and we would have no criticism to make of it were it not so dangerous to national well-being. The sacrifice of sincerity and integrity may be overlooked in many types of private enterprise, but no one deeply interested in promoting sane thinking in crucial times can fail to deplore the extent to which the public mind is being misguided by inaccurate reporting and insincere interpretation on the part of some large newspapers. Regardless of the merits of either side of any controversy in which newspaper editors may become engaged, it is regrettable that the public can not be allowed to form its own opinion on the basis of information that is in all ways dependable. The country is in serious need of more deliberate and intelligent thinking on the part of the people, but this need is not likely to be met as long as certain newspaper publishers are unable to place public welfare above private interest.

Nonmetallic-Mineral Producers Working Satisfactorily Under Codes

Investigation on 3,900-Mile Tour Discloses Few Serious Difficulties

THAT there is general approval of the methods of industrial control set up by the National Recovery Administration and general satisfaction with its results so far as the mineral-aggregates and related industries are concerned are the conclusions of one of PIT AND QUARRY'S editors, who has just returned from an extensive investigation. Determined to ascertain, as far as possible, to what extent code provisions are being complied with and how well those provisions meet the needs of producers, an ambitious plan of first-hand study was decided upon. The investigation just completed covered eight states included in three different code regions and embraced all the nonmetallic-mineral industries operating under N.R.A. codes—cement, lime, crushed-stone, sand-and-gravel and slag, feldspar, mica and limestone (dimension stone). The route of investigation ran through Indiana (in Region 9) ; Kentucky, Tennessee and North Carolina (which constitute Region 6) ; and Alabama, Florida, Georgia and South Carolina (of Region 5). It measured nearly 3,900 mi. in length and touched large, small and intermediate-size producers and the operators of stationary and portable plants. Scores of executives were interviewed and dozens of operations were investigated. Corrective and corroborative testimony was obtained from the three groups of interests involved—producers, workers, and consumers.

On the questions of hours of labor and rates of pay there seems to be almost universal agreement that the provisions are reasonable and that compliance is almost complete. A few violations were reported, one of which resulted in the loss of an operator's Blue Eagle. In certain states where Negro labor is widely employed there were reports of discriminatory treatment, caused by an unwillingness to pay Negro workers the rate given to white workers, although the code requires uniform treatment.

There seems to be a general desire to defer action on the establishment of "permissive" areas until the greater problem of open prices can be settled. Not much good is expected to result from the adoption of such areas because of the widespread belief that few, if any, of them will be approved by the N.R.A. Meanwhile, their chief value has seemed to lie in their deterrent effect, which it is not expected will continue for long.

The open-price policy, where not already in operation, is looked upon as a means for rapidly and basically bettering the competitive situation. This conclusion is founded largely on the reports emanating from areas where it has been adopted. Besides providing a protective cover for higher but more uniform production costs, due to shorter hours and higher wage rates, the policy is believed to provide the solution to the price-cutting problem. The experiences of states operating under the open-price policy substantiate this.

Wages and Hours.—Most of the producers interviewed have few complaints to make on the score of hour and wage provisions. In fact, most operators were heartily in favor of them, not only because they enabled their employees to live in a decent manner but also because these provisions serve to equalize the cost of production for competitors serving the same territories. In the past some producers by paying low wages and working long hours were able to undersell their competitors. The producer operating in or near a large city has benefitted especially by the enforcement of these provisions because his wages have usually been considerably higher than those of competitors located farther from the centers of population.

It is significant, also, that most of the complaints on the hour and wage provisions came from producers who formerly were in low-priced territories and now have lost this advantage over their competitors. Producers were almost unanimous in stating that prices had advanced sufficiently to more than cover the increased cost of operation. In some cases where business has shown little improvement and plants are working only part time no change in operating cost was reported as the producers were able to reduce working hours by more efficient utilization of their workers.

Cheap Labor.—A few producers admitted having considerable trouble with workers, both white and Negro, because of the sudden wage increase due to the code. Some of these producers formerly paid wages of 10 and 12 c. or even less per hr. for 60 or more hr. per week. Now, with a wage rate of 25 or 30 c. per hr. and a limit of 40 hr. per week, many employees are receiving more than double their former incomes and have a greater amount of leisure. These workers, naturally, are enthusiastically in favor of these code provisions.

The complaints of producers are mainly that many of their employees will work the first two or three days of a week and lay off the rest, that drinking on the job has increased, that most of the workers, unused to having more money than just enough to live on are wasting it, buying things they do not need, and falling prey to profiteers. Most producers, however, say they have had no trouble with their employees on this score because they have, over a period of years, weeded out the unfit and built up a selected crew of workers that could be

depended on. The increased spending is aiding local business, they find.

Hardships to Workers.—In some of the more prosperous sections of the South, where good wages have always been paid, the hour and wage provisions are regarded as unfair to the worker. This is the opinion of many workers interviewed and by their employers as well, many of these employers having no complaint to make on their own account. Take for example, a worker who formerly got 25 c. per hr. By working long hours during the rush seasons he could lay aside enough money to carry him through the dull winter season when his income amounted to little. Under the code this worker now receives 25 or 30 c. per hr. but is restricted to 40 hr. a week. The result is that when demand is brisk additional workers are added, all getting a reasonable income but not enough to carry them all through the winter. When demand dies down the extra workers are laid off first and the regular help later. Thus the employee's total income for a year is decreased to a point where he will not be able to live throughout the year on it.

Some skilled workers who were making more money than the code limit before the code went into effect also seem to have just cause for complaint because the code has meant no increase in their hourly pay but has resulted in a decrease in their working hours. The intent of the code, of course, is to increase the wage rates of all employees, perhaps not as much relatively in the higher as in the lower brackets but at least to a reasonable extent. Som employers, whether intentionally or through oversight, have increased only the wages of those who formerly received less than the code minimum and let the others remain as they were. This condition is gradually being righted.

Take the case of a shovel operator in one plant. Before the code he got 40 c. per hr. and worked 60 or more hr. a week. As a result he was able to live on a little better scale than the common laborer in the plant. Now he makes less than two-thirds his former income and the common laborer, whose income was in some cases almost tripled, is getting 30 ct. per hr., or almost as much as the shovel man earns.

Hour Difficulties.—The hour restrictions seem to be more disliked by most producers than the wage provisions. While operating only one shift or at part capacity little difficulty was encountered but when demand increased so that more than one shift was required the adjustment difficulties began. Ordinarily a producer would increase the working hours of his regular day shift until a second shift became an absolute necessity. He then ran both shifts regular hours, distributing his key men between the two shifts. Now he is forced either to add a second shift immediately after the demand increases beyond the capacity of a single shift or to turn away business. When adding a second shift in a case like this, he must either work his second shift short hours or split up the work between the two shifts. In either case the regular employees are dissatisfied because it means reduced incomes at times when business is best.

Other producers say they have solved this problem by working each man the full code hours, say five 8-hr. days a week and staggering the work so that the plant actually works 6 days a week, and by making other adjustments as business increased or decreased. Another producer whose work requires more than one 8-hr. shift is running two shifts, each working 6 hr., 6 days a week, with each man getting a few hours of extra work per week to keep him up to the code limit. Problems vary considerably in different operations, but if a large proportion of producers are able to meet this condition satisfactorily most of the other producers should also be able to do so. Several other producers said the hour limits made little trouble for them except when repairs were made after regular working hours.

Some difficulty is also being experienced by producers operating floating equipment on which more than one shift is required. Not enough of these producers have yet reached this stage, however, to allow a fair discussion of this subject to be made.

Code Violations.—Violations of the various code provisions reported have been surprisingly few and most of these, when investigated, proved to be unfounded or due to misinterpretation or misunderstanding on the part of the offender. In all except a few cases these violations were corrected immediately. In only one case that came to the investigator's attention in this territory was it found necessary to take drastic action after repeated warnings had gone unheeded. In this case the producer lost his Blue Eagle and subsequently closed his plant, because no public buyers and few private buyers were willing to purchase materials not produced under code conditions.

Pre-Qualification. — Aggregates producers in Kentucky have already been benefited by a Highway Contractors Pre-Qualification Bill which has been passed and will go into effect in June. This bill is similar to the one which went into effect in Ohio in January of this year and provides for the classification by financial condition of all bidders for state work. The rating given the bidder determines the size of the job he is qualified to carry. This bill has already had the effect of keeping out producers who formerly were responsible for cut-throat prices and also keeps the contractor from getting jobs too large for him to handle. Formerly this often resulted in failure and an inability to pay bills for aggregates, equipment and other materials purchased. The real enforcement of this bill lies with the bonding companies which limit a contractor's credit according to the rating given him. A material and labor lien law allows the filing of claims against contractors for material supplied, the state holding out this amount from the contractor's payments.

Unions.—Many reports were heard of attempts to unionize plants but only one actual case was encountered. This was in the Birmingham district where an organizer for the American Federation of

Labor had succeeded in completely unionizing one of the largest lime plants in the Calera district just south of Birmingham. Efforts to organize other plants in that district had been unsuccessful at the time this district was visited.

Government-Operated Plants. — Competition from plants, both permanent and portable, operated by states, counties, cities and other governmental bodies, is quite generally regarded as responsible to a large extent for the depressed conditions in commercial aggregate production. It is well known that the percentage of the total production of aggregates being produced by such plants has increased rapidly in recent years at the expense of commercial producers. In Tennessee it was estimated by one producer that the government-operated plants in 1933 produced about five times as much material as did the commercial plants. In an effort to remedy this condition commercial producers investigated the operation of these plants and were able to show state highway officials that a large proportion of this material was being produced at a cost considerably higher than that for which it could have been purchased on the open market. As a result the state closed the plants which were not economically justified and the commercial producers are getting the business formerly lost to them.

One producer, who has always been prominent in national and local affairs of the aggregates industries, believes that similar concerted efforts by producers in other states would have similar beneficial results. It is believed that many of the plants operated by governmental bodies are kept going solely to justify their purchase or to give employment.

Complaints against plants operated with prison labor were especially bitter wherever such plants exist. In at least one case prison officials were not satisfied with supplying aggregates for state road work but were also selling them on the open market. Needless to say, the price asked was low enough to make it impossible for the commercial operator to compete. In Indiana crushed stone is being produced both at the penitentiary at Putnamville and the reformatory at Pendleton. In the presence of the investigator a producer called a small dealer and trucker of stone who stated that he was buying stone at Putnamville at a figure considerably lower than the market price. According to several producers, this plant has been selling agricultural limestone to the farmers of the state for years.

Confliction of Codes.—Some complaint was made by a few producers who are operating under more than one industrial code because of conflicts in their provisions regarding hours and wages. One producer in a southern state presents a good example, although his case is an extreme one. This producer operates a sand-and-gravel plant in a large industrial city and also handles coal and building materials and manufactures brick, all on the same property. The seven codes under which he operates include those for the mineral-aggregates, building-material, brick-manufacturing, coal-dealing, and other industries. The problem in this case is caused by the necessity for constantly shifting employees from one of these operations to another. None of these operations are running anywhere near capacity and none are extensive enough to require more than a few men each even during busy seasons. For this reason it is often impossible to keep a man working in any one of these industries even for a full day. Needless to say, the timekeeping and bookkeeping departments are kept busy under these conditions.

Where producers are working under codes in related industries, however, no conflictions are reported. Producers of both lime and crushed stone, for example, report no conflictions of any kind as both industries have identical provisions on hours and wages.

Poor Business.—The chief cause of dissatisfaction among producers at present has no connection with the code. Except in sections where business has shown an increase, producers are unanimous in declaring that although prices are high enough, cooperation among producers is satisfactory, and hour and wage provisions would work no hardship, if a substantial increase in demand were to take place. In spite of general reports on the improvement of business conditions and statistics on the amount of P.W.A. construction under way or contracted for, large sections of various states seem to be getting little benefit from them.

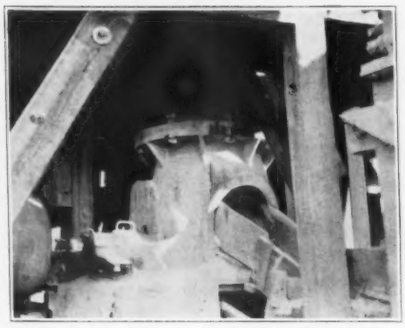
In Florida the complaint is made that most of the public-works construction is going on in the eastern part of the state. In the Carolinas it is claimed that the highway systems have reached a point of completion where little improvement is possible and consequently little work is expected from this source. Many cities were slow in submitting their public-works projects and as a result were too late to get their projects included under the original appropriation for public works. Some improvement is expected from the additional $500,000,000 appropriation asked for by President Roosevelt.

In Alabama a state law limits the bonded indebtedness of the various governmental subdivisions of the state, most of which were already up to the limits set for them and consequently were unable to take advantage of public-works funds. Pressure is being brought to amend this law. This would necessitate calling a special session of the state legislature which does not meet in regular session until 1935. According to the best information available, there is little possibility of the governor of the state calling such a session.

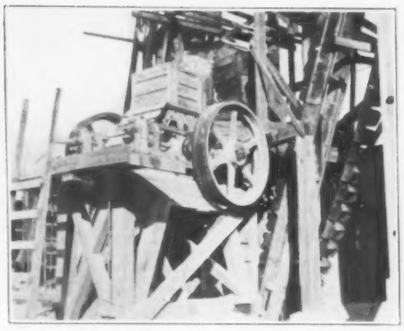
Prices.—Prices being received for aggregates have in general been increased to reasonable levels in some states partly due to open-price policies and in others mainly to the increased cost of production and a better competitive spirit among producers. The open-price policy seems to have been uniformly successful wherever adopted and in states where it

(Continued on page 32)

The primary jaw crusher with feed belt-conveyor at left and bucket-elevator to screen at right.



The gyratory crusher which is used both for secondary crushing and for reduction of oversize.



The roll crusher which is also used for secondary crushing. Bucket-elevator at right feeds to screen.

New Plant in Florida Utilizes Silicified Limestone as Raw Material

Power for All Processing Operations Supplied by Single 80-Hp. Oil Engine

By W. E. TRAUFFER

THE territory around Ocala, in the central part of Florida, has for years been one of the main sources of supply in that state for road material, concrete aggregate and lime. Recently a number of new developments have again brought this section to the fore. One of these developments was the erection of a new crushing-and-screening plant by the Florida Trap Rock Products Co. at Zephyrhills. This plant, which went into operation about a year ago, is located 3 mi. east of Zephyrhills, near Hillsboro River.

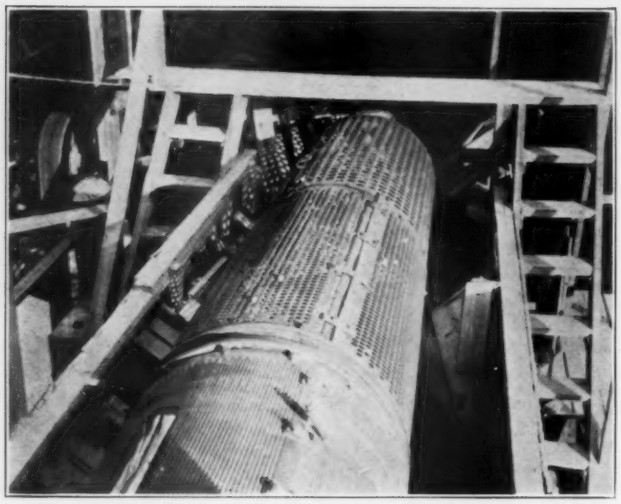
The deposit which supplies this plant was discovered about 8 yr. ago by a producer who was prospecting for a gravel deposit. A company was then formed to develop the deposit but nothing was done until 3 yr. ago, when R. I. Meader, the present owner of the company, took an option on the property. After thorough investigation he erected the present plant.

The deposit is a silicified limestone or flint rock similar to other stone found in this section of the state but differs from most of these deposits in its extent. Most other deposits consist of large bowlders buried in swampy soil, while this deposit is almost unbroken over an area of about 2,000 acres. According to Mr. Meader, the rock has a specific gravity of 2.54, a French coefficient of 14, and an absorption of less than 1 per cent. It has a silica content by chemical analysis of about 86 per cent. The deposit averages 12 to 14 ft. in depth below which point is ordinary soft lime rock, about 99 per cent. pure, for at least 40 ft. This material may be produced later if present plans are carried out.

The overburden on this deposit varies from out-

The ¾-cu.yd. gasoline clam-shell crane which is used for stripping overburden from deposit.

Workers in quarry sledging stone to crusher size and loading by hand into side-dump car.



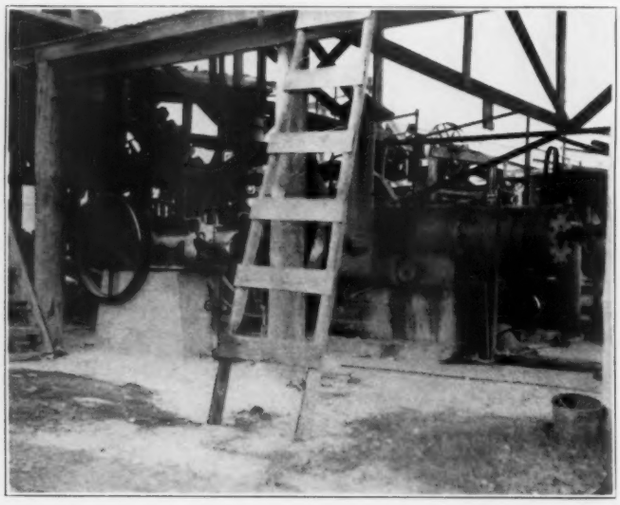
The revolving screen which does all the sizing for this plant. A dust jacket is added for certain products.

croppings to 3 or 4 ft. in depth and is removed with an Austin gasoline crawler crane handling a ¾-cu.yd. Owen clam-shell bucket. The rock is drilled with Ingersoll-Rand 49 and 79-lb. Jackhamers, and an attempt is being made to develop a regular face. Ten or more holes are fired at one time and are staggered to get the best possible results. No secondary shooting is being done at present, the oversize stone being sledged down to crusher size. The most difficult problem encountered has been the removal of a sticky clay which occurs in seams at intervals. Attempts to wash this clay off have been unsuccessful. The best results have been obtained by allowing the clay to dry on the broken rock for a day or two, after which time it scales off very easily. The quarry drains to a sump, from which water is recovered by a small centrifugal pump driven by a small oil engine which supplies the water to the plant for washing purposes.

The crusher-size stone is loaded by hand into 2½-cu.yd. side-dump cars which are hauled up an incline to the plant by a hoist and cable. The rock is dumped from the cars to a hopper, which discharges it to a cleated picking belt-conveyor on which any remaining foreign matter is removed. The conveyor feeds the Traylor 12-in. by 22-in. primary jaw crusher which reduces the material to 4 in. and under. The crusher discharge goes to a belt-bucket elevator which feeds through a split chute to either or both of two secondary crushers. One of these is an Allis-Chalmers Gates gyratory crusher and the other a Kennedy roll crusher.

Both secondary crushers discharge their products to a belt-bucket elevator which feeds the revolving sizing screen. This ordinarily has ¼-, 1- and 2-in. openings on the main barrel, but a dust jacket is sometimes added for special products. The plus 2-in. stone is chuted back to the gyratory crusher for further reduction, the other 3 sizes going direct to bin-storage. The timber bin has four compartments of 1-car capacity each, three of which are used for stone and the fourth for dust. Trucks are loaded under the bins through lever-operated sliding gates. A shaker-type washing screen of the company's own design under one of the bins can be used when necessary and any size can be run over it to remove dust.

A general view of the plant with incline from quarry at left. Both the jaw and roll crushers are visible.



The 80-hp. oil engine which operates the entire plant. Air-compressor for quarry drilling is at left.

The primary crusher is at present the bottle-neck in the plant and will soon be replaced with a 36-in. jaw crusher. With the present equipment the capacity of the plant is about 40 tons per hr. and this will be increased considerably. The entire plant is operated by a Primm 80-hp. Type SS oil engine which drives a line-shaft through a Conveying Weigher Co. rubber belt. Individual belt drives from this shaft drive the hoist, secondary crushers, and a Chicago Pneumatic air-compressor which supplies air for quarry drilling. A bevel-gear drive on this shaft operates the bucket-elevator and revolving screen and a second shaft, driven by gear from the first, drives the primary crusher and belt-conveyor through belts. With the exception of the main belt, all these drive belts are the Pacemaker brand made by the Cincinnati Rubber Co.

(*Continued on page 34*)

Fig. 1. Movable towers 60 ft. high used as trippers. Tunnel containing reclaiming belt-conveyor at right.

Fig. 2. Removing gravel from pit by means of series of horizontal and inclined belt-conveyors.

Synchronous and Induction Motors for Driving Belt-Conveyors

By R. F. EMERSON
Industrial Engineering Dept., General Electric Co.

THE motors used for driving conveyors are usually of the a.-c. type because this is the kind of current available. The squirrel-cage type of induction motor is used because this is the simplest and most trouble-proof motor built, particularly suitable for mill and quarry service where a certain amount of dust or dirt is prevalent and the service is severe. This motor is essentially a constant-speed unit. Since material is usually required to be delivered at a constant rate of speed, an adjustable-speed motor is not usually required. Where adjustable speed is required or for special reasons a smooth start is necessary, a wound-rotor induction motor can be used.

In plants that have low power-factor synchronous motors for driving conveyors can be used to advantage for raising the power-factor. Operation with a lagging power factor is an inherent characteristic of any induction motor. This means that there is circulating a certain amount of wattless or "workless" current, which is doing no useful work but which tends to heat the motor and the feeder copper. If a plant's load consists of a large number of induction motors running at part load, the proportion of wattless current is much greater than if the load consisted of motors all carrying their rated full load.

Conveyors are often over-motored, which means that the motors are running at part load most of the time. In the case of induction motors this means a low power-factor for the plant system. For example, an induction motor having an 83-per cent. power-factor at full load may have a power-factor as low as 65 per cent. at half load. If a number of partially-loaded induction motors in any plant could be replaced by synchronous motors of the same size operating with over-excited fields, the synchronous motors would carry the same mechanical load but would operate with a leading power-factor. They would not take lagging wattless current but would supply leading current which would nullify the lagging wattless current caused by the use of induction motors elsewhere in the plant. If the plant generates its own power, this releases generator and feeder capacity for other useful loads. If the plant purchases its power, benefit will be derived by having a lower power bill, because an industrial-power contract usually contains a power-factor clause that makes high power-factor profitable to the consumer.

Fig. 3 shows approximately the amount of corrective kv.-a. delivered by a synchronous motor at any load, provided the excitation is maintained at its rated full load value. Fig. 4 shows the corresponding power-factor at which the motor operates under this condition. For example, a 50-hp., 0.8-power-factor synchronous motor carries a 30-hp. load and it is required to find the leading kv.-a. and the power-factor of the motor. The percentage of $\frac{30}{50}$ rated horsepower becomes — or 60. On curve 2, Fig. 3, the leading kv.-a. at this horsepower is $0.745 \times$ rated horsepower $= 0.745 \times 50 = 37.2$ kv.-a. Curve 2 of Fig. 4 shows the power-factor at 60-per cent. load to be 58 per cent., and the 37.2 kv.-a. will nullify an equal amount of lagging kv.-a. caused by induction motors and will relieve the generating system of this amount of useless load. Synchronous motors can be designed for operating at various power-factors, and in order to obtain power-factor improvement a motor designed for

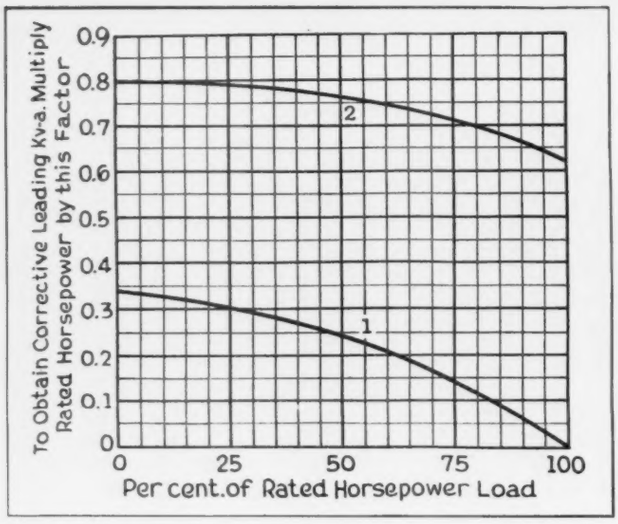


Fig. 3. Curves indicating approximate amount of corrective leading kv.-a. when using synchronous motors.

leading power-factor should be used rather than an oversize unity-power-factor motor. Direct-current excitation for synchronous motors is usually furnished by direct-connected exciters.

Inclined Conveyors.—For conveying material up or down steep inclines (Figs. 1, 2, 5 and 6), where the load tends to overhaul the motor, it is desirable to use a spring-set service brake on the head shaft (Fig. 7). As long as the driving motor is energized and the conveyor is moving the brake remains released by means of a solenoid or a Thrustor, but in the event of the failure of power, or if the motor should be shut down due to the opening of the line switch, the brake will set and thus prevent the belt-conveyor running back and spilling material at the foot of the incline.

On installations where the material is carried down-grade and the induction motor is operating as an induction generator, returning energy to the electric-power system, it is important to guard against any possibility of the conveyor overspeeding or running away. The use of the solenoid or Thrustor spring-set or weight-set brake is very necessary. In the case of drives using d.-c. shunt-wound motors it is necessary to have an overspeed governor, driven from the main shaft, which will trip the gravity or spring-set brake on the head sheave in case the speed should exceed a given amount. This is due to the fact that even though a d.-c. motor is cut loose from its electric-power supply, it will generate its own voltage and furnish its own excitation, and this voltage will keep the brake released. The overspeed governor will interrupt the solenoid or Thrustor brake circuit and allow the brake to set. An induction motor will not regenerate its own voltage in this way and for this reason an overspeed governor is not absolutely necessary.

The amount of saving experienced from the regenerative action of the induction motor will depend on the angle of incline and the amount of material being lowered. This advantage of getting regenerated power is not generally stressed, as the main advantage will doubtless be found to come from reduced wear on the brake drums with a consequent reduction in maintenance. One advantage of the conveyor over other systems of retarding by regenerative braking is that it returns power to the electricity-supply line at a fairly constant rate.

Fig. 5. Eighteen-inch belt-conveyor, 132 ft. long, carrying stone up steep incline.

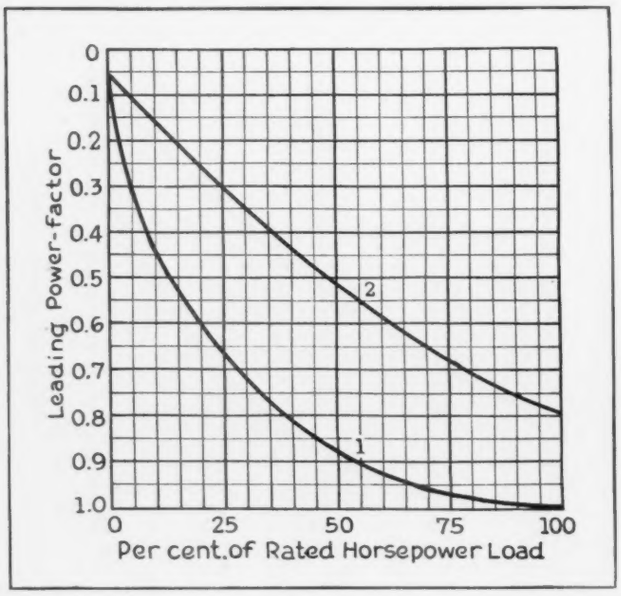


Fig. 4. Curves showing power-factor at which synchronous motors operate.

Repeated Starts.—Occasionally small conveyor belts used as feeder conveyors are required to start and stop several times a minute. This starting and stopping of a feeder conveyor is often required where the conveyor discharges into buckets on an aërial tramway, being started and stopped by means of limit switches. In all such installations the driving motor should be carefully checked for heating. An induction motor may draw from 7 to 8 times its full-load current during the period of starting and this will cause the motor to overheat very rapidly if the number of starts per minute is excessive. Fig. 8 shows the number of starts per minute that could be made from a certain size general-purpose squirrel-cage motor on curve A. Curve B shows another

Fig. 6. Belt-conveyor 450 ft. long carrying crushed stone up 16-deg. grade.

Fig. 7. Induction motor and control equipment for belt-conveyor shown in Fig. 6.

type of squirrel-cage motor having high-resistance rotor winding designed to cause the motor to exert high torque at starting and having reduced starting current. The result is that whereas the general-purpose motor can make 7 starts per min. with a given inertia load, the high-torque motor can make 11 starts per minute without exceeding its guaranteed temperature rise. In the present case if more than 11 starts per min. were required, it would probably be necessary to use a wound-rotor induction motor with external resistance. In the case of the motors represented by curves A and B all the heating is dissipated within the windings of the motors themselves, and by using a wound-rotor motor it would be possible to dissipate much of this heating in external resistance boxes.

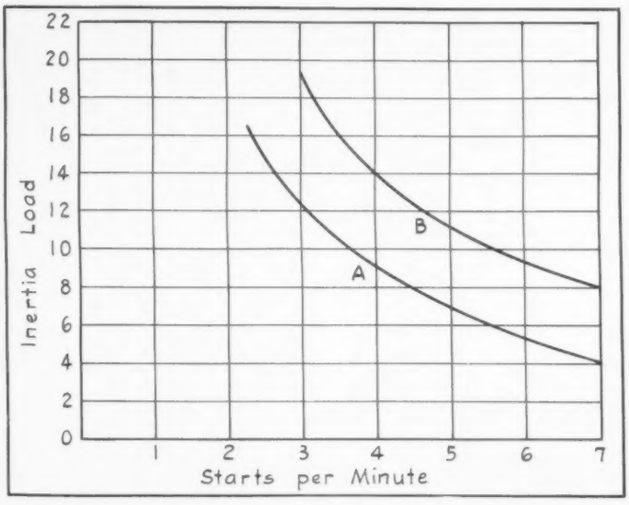


Fig. 8. Increased number of reversals per minute obtainable by using high-resistance rotor motor.

Conveyors usually require high starting torque on the part of the motors and in cases where silent-chain drive is used between the motor pinion and the drive it is desirable to check the chain manufacturer to see if the chain is of sufficient strength to withstand repeated starts, particularly if the motor starts on full voltage. In many successful installations now in service and using chain drive the motors start on full voltage and exert as much as 200 or 250 per cent. of their full-load torque at starting.

Gear-Motor Drive.—Since the speed of the head pulley of any conveyor is considerably less than the motor speed, it is invariably necessary to have a mechanical gear-reduction between the motor and the head pulley. Fig. 9 shows a gear-motor which consists of an induction motor with a planetary gear-reduction built into the motor frame. A standard gear-motor can be furnished with a driving shaft having a speed as low as 13 r.p.m., which can be used for direct connection to the head pulley, thus making a compact and highly-efficient unit. Ratios as high as 500 to 1 are also obtainable. This method of speed reduction usually results in the use of smaller motors than would be the case if some less efficient method of speed-reduction were used.

In addition the gear-motor, direct-coupled to the conveyor head pulley, results in much greater economy of space than when the speed-reduction is obtained by other methods. With a direct-coupled drive there is no bending moment to be considered. The stresses introduced are due to torsion which tends to reduce the size of the driving shaft and bearing. It also results in reduced maintenance, less power consumption, and greater safety to workmen.

Gear motors are designed so as to combine a high-speed motor with a slow-speed output shaft. Aside from the fact that this means a smaller and less

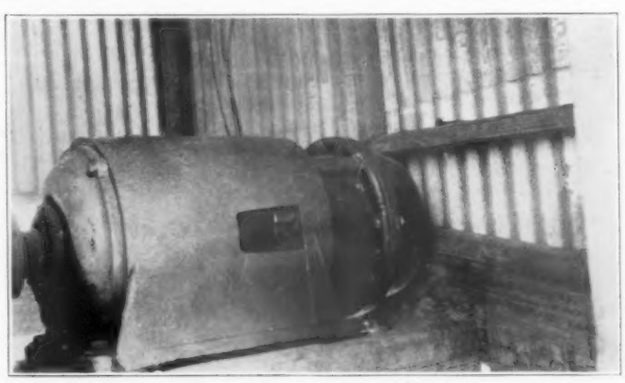


Fig. 9. Double-reduction gear-motor of squirrel-cage induction type driving belt-conveyor.

costly motor, there is one other important advantage accruing to the use of a high-speed motor, which has already been discussed, *viz.*, high power-factor. For example, a 60-cycle, 3-phase, 25-hp., 1,800-r.p.m., squirrel-cage induction motor will have a much higher power-factor at all loads than a motor of the same rating having a speed of 600 r.p.m., as shown in the following tabulation.

	Power-Factor at:		
Motor Rating	Full Load	¾ Load	½ Load
25-hp., 1,800-r.p.m.	91%	87½%	78%
25-hp., 600-r.p.m.	78%	71%	57%

If gear-motors are installed when new conveyors or other equipment are first purchased and care is taken to see that they are worked as closely as possible to their full-load rating, it will not often be necessary to resort to synchronous motors or other methods of raising plant power-factor.

Good starting torque is another characteristic which favors the higher speeds used in 60-cycle induction gear-motors. An 1,800-r.p.m. general-purpose squirrel-cage motor can be expected to have close to 150 per cent. of full-load torque at starting, whereas that of a 600-r.p.m. motor may be as low as 115 per cent.

Size of Motor Required.—Conveyor manufacturers have extensive data available for determining the size of motor required for driving any given belt-conveyor. A rule-of-thumb method for estimating the power requirements of a belt-conveyor is to take 2 per cent. of the number of tons per hour of crushed rock carried for each 100 ft. of horizontal belt length. In case the conveyor is inclined, an additional 1 per cent. should be added for each additional 10 ft. of rise of the inclined belt. This rule is not very accurate for excessively light or excessively heavy bulk material but for handling crushed rock, cement, coal and similar material it is fairly accurate. The result thus obtained is the power required to drive the conveyor at the head shaft. If there are several gear-reductions between the motor and the head sheave, the horsepower found by the above calculation should be increased. This increase may be as much as 30 to 50 per cent., depending on the number of gear-reductions and whether the gears are rough-cast or cut. If a direct-connected gear-motor of the planetary type equipped with anti-friction bearings is used direct-coupled to the conveyor head shaft, an increase of only 5 per cent. to the horsepower calculated by the formula is necessary.

Code Working (from page 26)

is not yet in operation producers regard it as an essential step before either producers or employees can benefit to any extent under the code. There have been few complaints of violations of this section of the code.

Open-Price Policy Evils.—The adoption of the open-price policy in some states seems to be working a hardship temporarily on producers in adjoining states who have not yet adopted it. In Alabama, for example, fair prices are being obtained by producers on sales made in the state. Georgia and Florida are not yet operating under open prices and producers in these states complain that Alabama producers are "dumping" in those states at prices they can not meet in many cases. They, of course, can not retaliate by "dumping" in the states where the trouble originates. This condition is only a temporary one which will disappear when the open-price policy is adopted in Georgia and Florida.

Kentucky producers express great satisfaction with the open price policy due to its stabilizing effect. Kentucky and all the surrounding states except Indiana are said to be under open-price policies and approval of the method for that state is expected at any time. Price-cutting by some types of operators has been virtually eliminated and conditions are now favorable for responsible operators of both permanent and portable plants.

Prices Too High.—Some producers were found who objected to the present increased prices and are against any further increase for the time being whether justified or not. This objection is based on the fact that the demand for aggregates for private construction is small and has shown little increase. These producers assert that this type of work is being discouraged by increasing prices. They would much prefer to have lower prices and greater volume than the present condition which they maintain is exactly the opposite.

Slag Differentials.—The open-price policy is in effect in Alabama and no complaints were heard on its workings except on the subject of a slag differential. Slag, gravel and crushed stone all sell for the same price per ton and have the same freight rates. Slag, however, due to its lower specific gravity, has a considerably greater volume per ton than the other materials and is therefore considered a better "buy" by many users. No compensating advantages are said to have been given stone and gravel producers who can not cut their prices to an equal volume basis under the open-price plan.

"Permissive" Areas.—As stated earlier in this article little work is being done on "permissive" areas except in states where the open-price policy is in satisfactory operation. The widespread belief that the National Recovery Administration has no intention of approving "permissive" areas is based on the fact that a number of proposed plans submitted by various states have apparently been pigeon-holed, some of them for several months. The fact that the various proposals submitted range from entire states, as in the cases of Alabama and Illinois, to more conservative requests which leave large territories open to new production gives credibility to this belief.

The altitude toward the "permissive" area provisions reflects the misgivings of many producers who, at the time the first tentative code was presented, felt that any attempt to stifle new enterprise would be frowned upon by the government. This feeling was strengthened by the opposition of portable plant operators at the open hearings in Washington, when it seemed for a time that the entire plan for limiting the building of new plants would have to be abandoned. Some producers express regrets that the method was ever proposed.

Loss of Stone Business Leads Pioneer Producer Back to Lime Making

Builds Modern All-Electric Plant in Alabama's Lime-Producing Area

THE lime-producing district in and around Calera, Ala., is considered by many to be a barometer of the business conditions in the South. The plants in this district operated at low capacity during the depression years but have enjoyed a steady increase in production since that time. Prices also have reached a level which will allow the making of a profit when operating at a reasonable capacity. Producers in this district are confident that this betterment is basic and will continue.

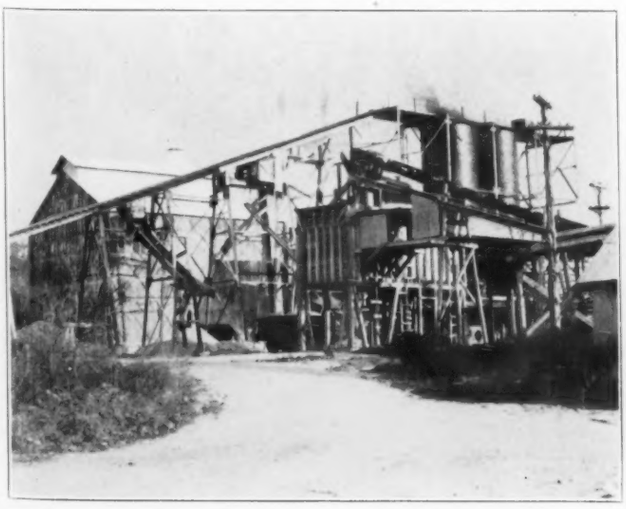
The new plant of the Alabaster Lime Co., Scottrock, Ala., was completed late in 1933, just in time to profit by this improvement in business conditions. This plant does not differ widely in its design and methods of operation from many of the other plants in the district. Unlike most of them, however, it is of steel-and-concrete construction throughout and is entirely fireproof. It relies solely on electricity for power.

George L. Scott, owner of the company, is one of the veterans of the lime industry in this section, having been a producer since 1904. He was president of the Keystone Lime Works, Keystone, Ala., from 1922 to 1928, at which time he sold his interest. A year later he acquired his present property and opened a quarry and small plant to produce fluxing stone for the Birmingham steel plants. This plant was operated until late in 1931, when it was forced out of business by the opening of the plants of the Tennessee Coal, Iron & Ry. Co., near Birmingham, which now supply all the fluxing-stone demands of that company. Mr. Scott began the construction of his lime plant late in 1932 and completed it in August, 1933. His son, George L. Scott, Jr., is in charge of the sales for this plant.

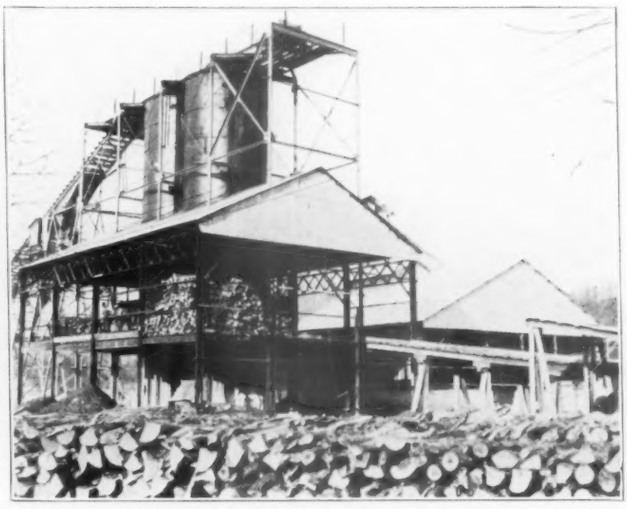
The new quarry opened for this plant has not yet reached its permanent level. The stone is the high-calcium limestone found in this region but is said by Mr. Scott to be somewhat more uniform in calcium content. The overburden is only a few feet thick and is loaded by hand shovel into trucks for disposal. Drilling is done with jackhammers and the stone is loaded by hand into 2-ton cars. These are pulled up the incline to the top of the kilns by a small electric hoist and their contents discharged directly into the kilns.

The two kilns have an exterior diameter of 14 ft. and are 55 ft. in height above their foundations. They are lined to a level 10 ft. below their tops with fire brick backed with red brick. Inside they have dimensions of 6 ft. by 8½ ft. and have the usual conical bottoms. They are fired from both sides with local coal and oak and hickory wood. Facilities for burning with natural gas will be installed in the near future.

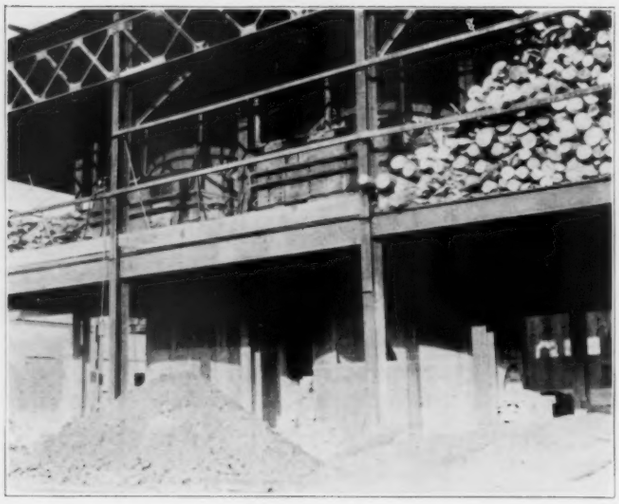
A 36-in. Jeffrey pan-conveyor collects the lime from both kilns and feeds it to a second 36-in. inclined pan-conveyor which discharges the lime on the concrete floor of the hydrator building. Here the lime is hand picked and shoveled to a Sturtevant rotary crusher which reduces it to the desired size for hydrating. The crusher discharge goes to a Stephens-Adamson steel-inclosed bucket-elevator which feeds a 100-ton steel storage-tank. From this tank the lump lime can be discharged by gravity through spouts either direct into box cars or into



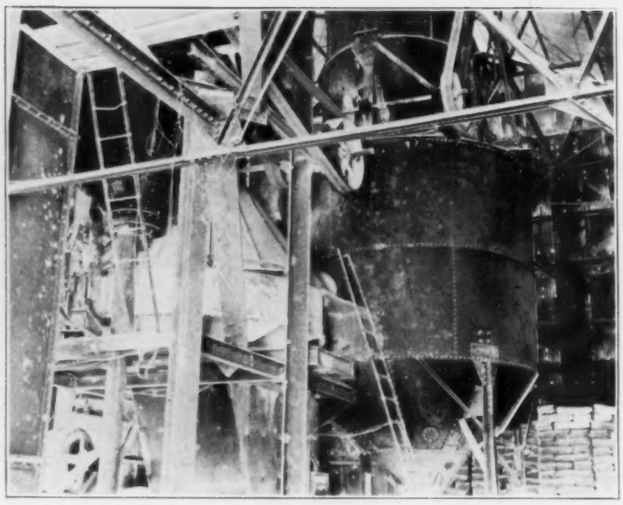
Plant of the Alabaster Lime Co. with incline from quarry at left and hydrator building in background.



Another view of plant showing some of the wood used for burning. Note fireproof construction of plant.



A close-up of the firing and discharge floors of the kilns. Pan conveyor visible under kilns handles burned lime.



Interior of hydrating building with hydrator at left and packer feed tank at right with air-separator above it.

drums or jute bags. Most of the quicklime is sold in bulk to steel plants.

The lime from this tank is also discharged to a Clyde 10-ft. batch hydrator which has a capacity of about 5 tons per day. The hydrator discharge goes to another inclosed bucket-elevator which feeds an 8-ft. Sturtevant air-separator. Rejects from the separator are wasted and the finished hydrate is discharged into a small steel feed-bin over a Bates 2-valve bag-packer.

Shipments of hydrated lime from this plant are made to all parts of Alabama, Georgia, Florida, and Mississippi, and to some sections of South Carolina, Louisiana and Tennessee.

Florida Trap Rock (from page 28)

A Fordson tractor is used for general utility about the plant.

The product of the plant is at present being trucked to either the Seaboard or the Coast Line railway; each is about 2 miles from the plant. The trucks discharge from ramps into cars on a siding.

Flint-Rock Producer Erects New Stone Plant in Northern Florida

THE increasing activity among aggregate-producing plants in the southeast is evidenced by the many plant improvements and new plants under way. One of the most recent developments is the erection of a new flint-rock plant at Zuber, Fla., about 8 mi. north of Ocala, by M. M. Thomas to replace an older plant at the same location. This plant will be in operation about May 1. Mr. Thomas has been operating flint-rock plants in central Florida since 1914 and before and during the "boom" operated six plants.

The deposit is similar to those supplying other flint-rock plants in this district, consisting of bowlders ranging up to 8 ft. in size buried in the swampy soil. These are uncovered on one side by hand digging and broken up by several sticks of dynamite placed under them. The broken stone is loaded by hand into trucks and hauled to the plant.

The trucks dump the stone into an Acme No. 10½ D jaw crusher which reduces it to 1½-in. size and under, discharging by gravity to a rotary scalping screen. The oversize goes to an Acme No. 9½ DD jaw crusher, the product of which, together with the throughs from the scalping screen, goes to a Link-Belt bucket-elevator. This feeds a rotary washing screen which discharges on a rotary sizing screen. The various sizes produced are discharged directly into timber bins from which trucks are loaded for shipment. Two sizes, 1-in. to 1½-in. and ½-in. to ¼-in., are usually made for road work and 1¼-in. to ¼-in. for commercial aggregate.

The plant is of timber construction with concrete plant and crusher foundations. The secondary crusher and scalping screen are driven through belt and lineshaft by a 35-hp. electric motor. The primary crusher and the remainder of the plant are driven in the same manner by a 50-hp. motor. Wash-water is supplied by a 3-in. Fairbanks-Morse centrifugal pump driven by a 7½-hp. motor. Cross perforated plate is used on the revolving screens.

The crushed-rock plant of M. M. Thomas at Zuber, Fla., while under construction.

Airplane view of the plant of the Pacific Portland Cement Co., Redwood City, Cal. Docks and barge unloading equipment at right.

The Nonmetallic Minerals of California

By WALTER W. BRADLEY

State Mineralogist, Division of Mines

ALTHOUGH California first came into public notice and prominence as a producer of gold and still leads in the domestic yield of the yellow metal, this state to-day has many other mineral substances under commercial exploitation and utilization. With increasing population on the Pacific Coast there is a gradual but sure growth in the number and character of industrial plants, established and operating, particularly in California. Quite a few nationally-known concerns have built, and others are now building, factory branches there to supply the coast markets. Such plants are also in a more favorable position to command a share of the oriental trade.

As indicated by the title, the present paper deals only with the nonmetallic group of commercial minerals, those ores or materials mined for purposes other than the extraction of their metal contents. In fact, the present paper is still further restricted largely to those substances in which the readers of PIT AND QUARRY are interested. These come under three of the five main groupings which the State Division of Mines utilizes in its statistical reports of mineral production, namely: structural materials, industrial materials, and salines. Incidentally, the other two classifications referred to are: metals and fuels.

Structural Materials.—As the designation indicates, the mineral substances grouped under the heading "Structural Materials" are those directly employed in building and structural work. Some of the commercial minerals classed by the State Division of Mines as "industrial" are more or less utilized in "structural" applications, but they have other uses as well. California is well supplied with structural materials. Practically any type or style of structure is possible with the wealth of local materials available. Deposits of granite, marble and other building stones in a great variety of colors and texture are widely distributed throughout the state. Although some of these deposits are as yet at considerable distances from cheap transportation facilities, the resource is a potential one that will some day become economic when population and the demand call for it.

Asphalt and Bituminous Rock.—In the earlier days of the oil industry in California considerable quantities of natural asphalt were mined from out-

croppings of oil sands, the business being conducted as an industry separate from that of the production of the crude oil. For some years now, however, most of the asphalt has come from oil-refinery residuum. Such natural asphalt as is at present mined in California is in the form of bituminous "rock" or sandstone which is being utilized for road surfacing in the districts adjacent to available deposits. The present operators of one of the quarries in Santa Cruz County have on the market a product which can be laid cold, a quality which makes it especially applicable to and valuable for patching jobs. Santa Barbara County is also still an active producer of bituminous rock. The native bitumens or asphalts, such as gilsonite grahamite, wurtzilite, elaterite, and the mineral wax, ozocerite, are not found in California (except for certain occurrences of gilsonite and grahamite which are of mineralogic interest only, not being in commercial quantities).

Brick and Blocks or Tile.—Bricks of many varieties and in important quantities are produced in California, suitable clays being available for practically any type of product desired. The varieties include common, fire, pressed, glazed, enamel, fancy, vitrified, sand-lime, and others. Not only do the plants supply practically all California's requirements in these products, but considerable quantities are shipped to contiguous territory and certain varieties are shipped a much greater distance. Hollow building-blocks or tile, being employed in part in the same role as bricks, are here included with them. The sand-lime variety of brick is made and utilized only in limited quantities in California. One such plant is that of the Orange County Brick & Tile Co. at Anaheim.

Cement and Concrete.—Cement in California has attained a position ranking below only petroleum and natural gas in point of the annual value of its output. It is now more than double the annual value of our gold yield. The crushed-rock and sand-and-gravel business in this state has grown by leaps and bounds, coincident with the advance of the Portland-cement industry, particularly since 1905. Study of the production curves of these two items reveals how closely parallel their growths have been.

Portland cement was first commercially produced in California in 1891; though in 1860 and for several years thereafter a natural hydraulic cement from Benicia was utilized in building operations in San Francisco. There are eleven producing plants in ten counties, there being two in San Bernardino County and one each in Calaveras, Contra Costa, Kern, Los Angeles, Merced, Riverside, San Benito, San Mateo, and Santa Cruz Counties. There are two other plants temporarily closed. Geographically, the state is thus fairly well covered.

To list the kinds and varieties of crushed rock utilized commercially would be to run the entire gamut of the classification scale. Much depends upon the kind available in a given district. Those which give the most satisfactory service are the basalts and other hard, dense, igneous rocks which break with sharp, clean edges. In many localities river-wash bowlders form an important source of such material. In such cases combined washing-and-crushing plants obtain varying amounts of sand and gravel along with the crushed sizes.

Sand and gravel, washed, screened, and pit-run, are obtained from stream beds throughout the length and breadth of the state. Under the sand heading we also include foundry molding sands. In several localities, both north and south, the molding-sand business is becoming important.

To-day's extensive program of concrete-road building and the construction of monolithic dams for hydroëlectric and irrigation plants, to say nothing of reinforced-concrete structures of all sizes and types, would be out of the question without Portland cement which requires the broken stone and sand to complete the aggregate. California is bountifully supplied with all these constituents. Production during the past six years has averaged in excess of 25,000,000 tons valued at $17,800,000 annually, though 1930-1931 was under the average.

The most important commercially-producing districts of crushed rock and sand and gravel are naturally those areas within economic transportation range of the larger metropolitan areas, Los Angeles County and the San Francisco Bay region. Other important districts include Butte, San Diego, San Bernardino, Sacramento, San Joaquin, Fresno, Ventura, Santa Barbara and Imperial Counties. Practically all the commonly-accepted, standard, or customary methods of operating can be found in use at one or another of the several hundred rock and gravel plants in this state, and even many crude and make-shift processes and equipment, not standard, at some of the smaller ones.

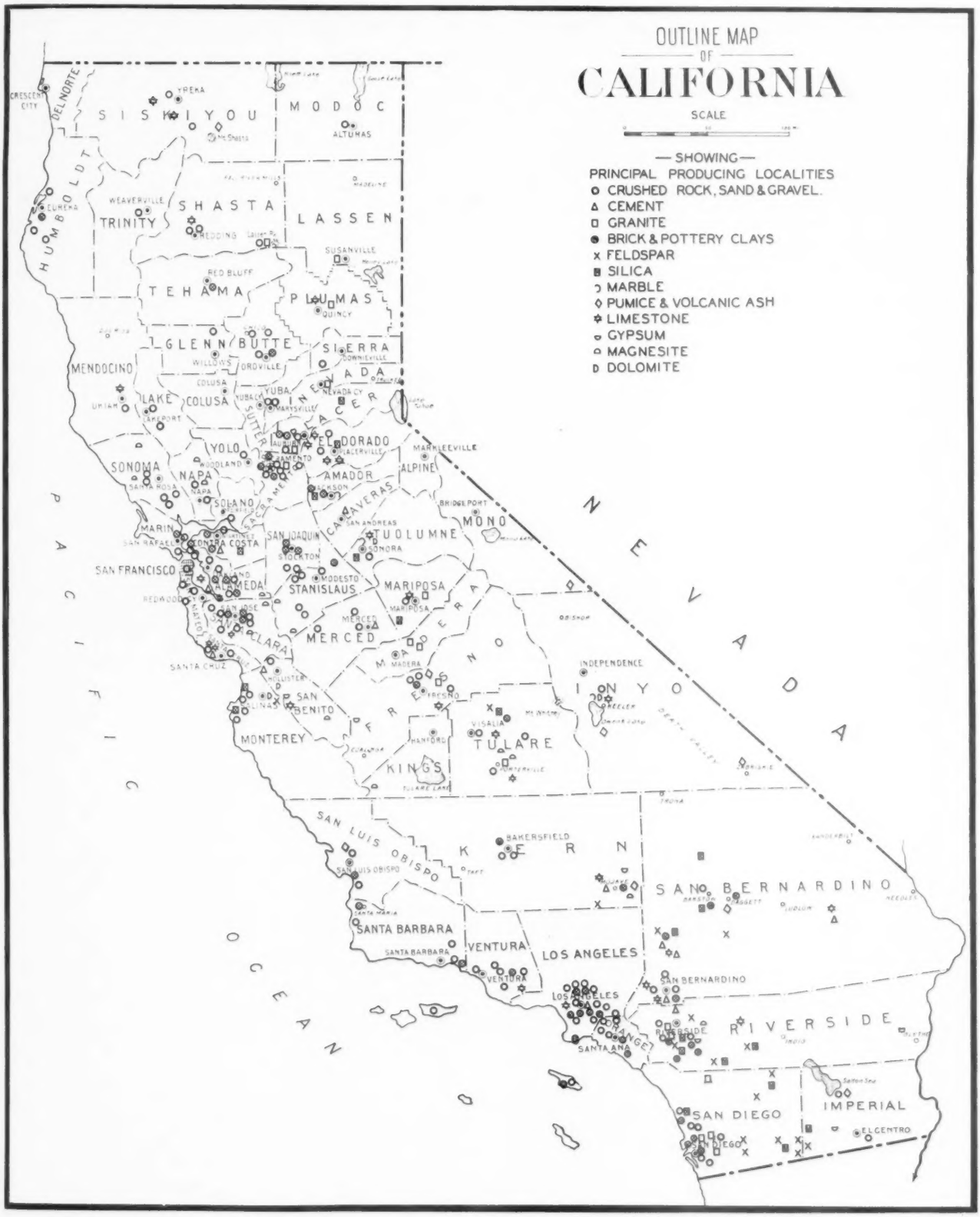
Rock Quarries.—In the rock quarries the usual open-cut systems are employed, including both surface tramming from the face and glory-hole drawing of the blasted material to an adit level. Neither time nor space allows descriptions, or even a complete listing, of all such plants in California. Important tonnages of greenstone, slate, red shale, and other colored chats, also limestone, for roofing and stucco granules and for terrazzo, are shipped annually. Some smelter slag has been used for railroad ballast.

Sand-and-Gravel.—The rapid growth of Los Angeles and the neighboring cities has created a large demand for crushed gravel, gravel and sand. The principal sources of supply of these materials are the river washes of Arroyo Seco (Spanish for "dry creek"), Pacoima, San Gabriel, and Tujunga. Through a long time these streams that have their sources in the San Gabriel Range have been depositing bowlders and sand over extended areas, not only in their drainage channels but spreading out over adjacent territory, creating great deposits of these materials in the San Fernando and San Gabriel valleys.

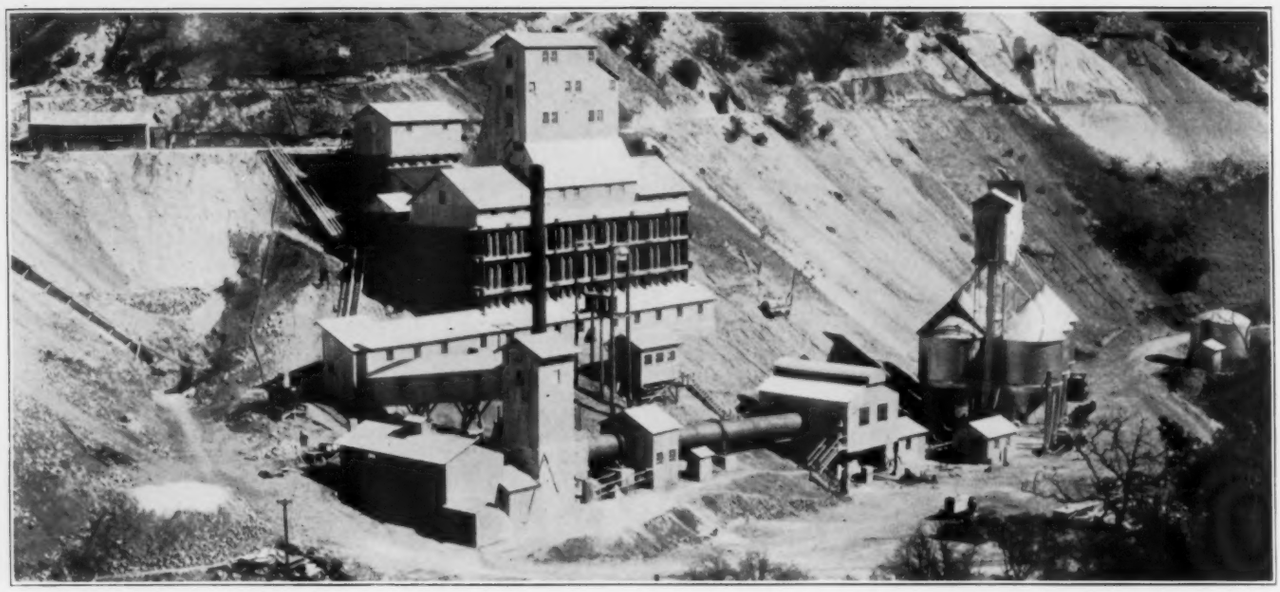
The deposits lying within 3 to 5 mi. of the base of the mountains have a preponderance of bowlders and coarse gravel, with a relatively-small percentage of sand; while farther down-stream the proportions are more nearly equal between sand and

gravel with the bowlders smaller. Granite is the chief constituent rock. The San Gabriel River and the Tujunga River areas constitute producing centers unsurpassed in the mineral-aggregate industry of the west.

Operations in these areas generally are characterized by steam-shovel work in the larger plants, while the smaller ones use the drag-line method in the course of which the material is extracted from pits that become wider, longer, and deeper as production continues. The presence of coarse gravel and large bowlders makes the problem in the majority of these plant operations more one of rock crushing and screening than of mere washing and



Distribution of the principal nonmetallic-mineral resources of California.



New Bald Eagle plant of the Sierra Magnesite Co. with crushing, screening and storage building above. Blended materials are fed to the rotary kiln which supplies the truck-loading tanks at the right.

screening as in ordinary plants. The important gravel areas referred to are served by either the Southern Pacific, Santa Fe, or the Pacific Electric Railroads, affording excellent facilities for shipping into Los Angeles and to other points in southern California. The distance from the San Gabriel and Tujunga areas to the center of Los Angeles varies from 20 to 25 mi. An important part of the products from these plants is also distributed directly by motor trucks to various parts of the city.

The largest producer in this southern California district is the Consolidated Rock Products Co., which was formed in 1929 by a merger of the Union Rock Co. and the Consumers Rock & Gravel Co. This company operates 20 gravel-producing plants and a number of distributing plants and ready-mixed concrete plants in Los Angeles and vicinity. Its equipment includes over 250 motor trucks.

The Pacific Coast Aggregates, Inc., was organized in 1929, as a merger of a majority of the then-important producers and distributors of sand, gravel, and crushed rock north of Tehachapi. The company controls 20 producing plants and 25 distributing plants in the San Francisco Bay region, the Sacramento and San Joaquin valleys. The delivery equipment includes about 100 motor trucks, 18 barges, and 7 tugs. The company's sand, gravel, and rock deposits cover 2,356 acres owned in fee and 1,113 acres held under lease, said to be sufficient to meet its requirements for 50 yr. at the present rate of production. Five producing plants are in Alameda County.

Portland Cement.—Portland-cement production in California for the seven years 1923 to 1930 averaged approximately 13,000,000 bbl., valued at $23,000,000 annually. The 1930 to 1932 output, however, has been below that average. The larger producers are: The California, Riverside, Santa Cruz and Pacific companies. Five plants—the Southwestern, the Old Mission and Redwood City units of the Pacific Portland Cement Co., the Calaveras, and the Monolith—use the wet process, all others in the state being dry-process installations. The Monolith plant was built originally as a dry-process unit, but has since been converted.

With the exception of two of the 11 operating plants, their limestone supplies are obtained by the usual quarrying methods. One of the most fortunately situated, from the standpoint of the quantity available, is apparently the California Portland Cement Co. with its plant at Slover Mountain west of Colton, San Bernardino County. The mountain is composed of crystalline limestone, all of which is suitable for the manufacture of cement. It is approximately 1 mi. long, ½ mi. wide, and 500 ft. high. The present quarry face is 3,500 ft. long and has a maximum height of 400 ft. The material is loaded into cars by steam shovels and hauled to the crushing department by electric storage-battery locomotives.

The Southwestern Portland Cement Co. is likewise well supplied with its plant at Victorville in San Bernardino County. Five quarries have been developed in a limestone belt 7 mi. northeast of Victorville. The actual thickness of the limestone is nowhere as yet exposed, although some faces are nearly 200 ft. high. The stone is crystalline, the color being both blue and white. The five quarries are in two hills, separated by a shallow canyon. Nos. 1, 3 and 5 in the more northerly hill have an aggregate quarry-face length of 3,200 ft. and an average height of approximately 75 ft. No. 4 to the south has an 1,800-ft. face, which is up to 180 ft. high. The rock is loaded into 30-ton standard-gage, side-dump railroad cars by three shovels. The plant, which was the first wet-process installation in California, was built in 1916 with a capacity of 1,000 bbl. daily. This has been increased from time to time to its present rating of 6,000 bbl.

The single plant of largest capacity in California is that of the Santa Cruz Portland Cement Co. at Davenport, Santa Cruz County, which is rated at

12,000 bbl. daily. Operations began in 1907 and up to 1925 limestone was obtained by open-cut quarrying worked on a single bench with steam-shovel loading. Since then, the plan of working is a combination of glory holes, transfer raises, "bull-dozing" chambers, chute loading, and adit transportation. This has greatly reduced the cost of delivery of the limestone to the mill.

The deposit extends over a width of 1,200 ft. for approximately ¾ mi. It is a homogeneous close-grained light-gray to white limestone free from magnesium carbonate. The area was diamond-drilled prior to the adoption of the glory-hole method and its extent found to be greater than anticipated, the tonnage being sufficient for a long period of operation.

The two exceptions noted above among California cement operations as to limestone-winning methods are the Redwood City plant of the Pacific Portland Cement Co. in San Mateo County and the Riverside Cement Co.'s mine at Crestmore, Riverside County. The former, built in 1924 and enlarged in 1927, is located on the western shore of San Francisco Bay. The raw materials utilized consist of extensive deposits of oyster shells together with silt and clay washed down from the surrounding hills. The oyster shells are practically pure calcium carbonate and the other necessary elements, silica, alumina, and iron, are contained in the accompanying clay in proper proportions for cement-making. These shells and clay beds owned by the company cover over 30,000 acres, extending on both sides of the channel of the south end of the bay from Milbrae to Alviso. The shells and clay are taken from the bay by means of suction dredges which discharge them through a 16-in. pipe into barges alongside the dredge, whence they are taken to the unloading wharf at the plant.

At the plant of the Riverside Cement Co. limestone is mined underground and hoisted through a 5-compartment vertical shaft which has been sunk in the footwall to a depth of 350 ft. The main haulage level is at 280 ft. with a series of intermediate levels between this and the collar of the shaft, which is at the west end of the old quarry floor. The method of breaking and extracting the stone closely follows the undercut block-caving system employed at the Ray Copper Mine at Ray, Ariz.

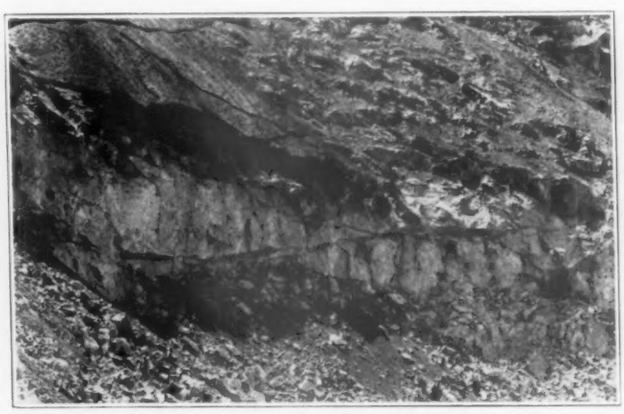
Granite.—For building purposes the granites found in California, particularly the varieties from Raymond, in Madera County, Rocklin in Placer County, and near Porterville in Tulare County, are unexcelled by any similar stone found elsewhere. The quantities available, notably at Raymond and Porterville, are unlimited. Granites of excellent quality for both building and ornamental purposes are also quarried in Riverside, San Diego, and Nevada Counties. Near Lakeside, San Diego County, there is a fine-grained "silver-gray" granite of uniform texture and color especially suitable for monumental and ornamental work. The McGilvray-Raymond Corp. is the largest producer in the state, operating quarries in Madera, San Diego, and Tulare Counties.

In Fresno County there is quarried a dark, hornblende diorite, called by the trade "black granite," whose color makes possible a fine contrast of polished and unpolished surfaces and renders it particularly desirable for monumental and decorative purposes. Similar but, for the most part, slightly lighter "black granites" are also being marketed from Tulare and San Diego Counties.

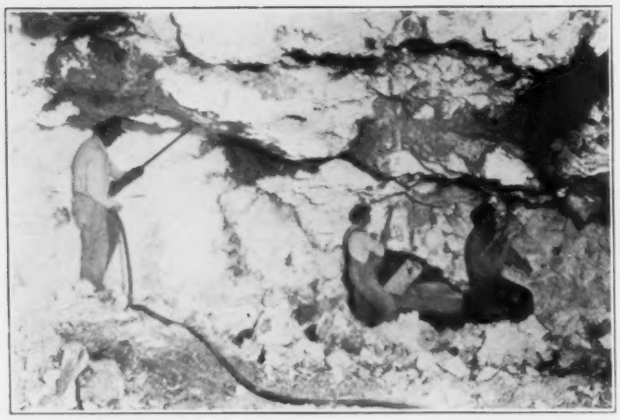
Marble.—Marble is widely distributed in California and occurs in a considerable range of colors and grain. There are many beautiful and serviceable varieties, suitable for almost any conceivable purpose of construction or decoration. In the decorative class are deposits of onyx marble and travertine of beautiful coloring and effects. There is also serpentine marble suitable for electrical-switchboard use. Material from only a few of these deposits has been put on the market commercially, partly because of transportation costs and partly because it is necessary to create a demand for it from architects and builders to justify the opening of a quarry. One of the largest producers thus far has been the Columbia Marble Co. near Columbia, Tuolumne County, with important amounts at times coming from the Inyo Marble Co. in Inyo County and the California Carrara Quarry in Amador County. Some of the onyx marble and practically all the travertine at present quarried is used in terrazzo.

Sandstone.—An unlimited amount of high-grade sandstone, mostly in grays and buffs or yellows, is available in California, but the wide use of con-

Loading rock asphalt into truck in quarry of Calrock Asphalt Co.



Side of glory-hole in quarry of Santa Cruz Portland Cement Co.



Drilling in the mine of the Sierra Magnesite Co.

crete in buildings of every character, as well as the popularity of lighter-colored building stones and other finishes, such as architectural terra cotta, has curtailed sandstone production here during recent years almost to the vanishing point.

Slate.—The color of slate is of economic importance, the common ones being gray, bluish gray, and black, though reds and various shades of green are occasionally found. The permanency of slate for roofing is well known. California has available supplies of black and gray slate that compare favorably for roofing purposes with those products found elsewhere. The principal localities are in El Dorado, Mariposa, and Calaveras Counties. Commercial production thus far has come mainly from El Dorado.

South Carolina Aggregates Producer Erects Bituminizing Plant

THE growing trend toward the operation of aggregate-bituminizing plants by aggregate producers is well illustrated by the plant just completed by Colprovia Road Products, Inc., Columbia, S. C. This plant is of heavy timber construction with concrete foundations and has a capacity of about 300 tons daily. The company has exclusive rights for Colprovia for the entire state of South Carolina and makes shipments by both railway and highway. The plant is located adjacent to the quarry and crushed-stone plant of the Palmetto Quarries Co., which supplies the necessary coarse aggregate. The fine material is furnished by another associated company.

Aggregate-bituminizing plant of Colprovia Road Products, Inc., Columbia, S. C.

The aggregate-drying and bitumen-heating plant is the only part of this operation which is not new. Other equipment consists of Hedges, Walsh, Widener weigh batchers and a pug-mill of the same make which is driven through a Falk speed-reducer by an Allis-Chalmers electric motor. The two batchers are fitted with Kron dial scales. A J. B. Wise pulverizer is used for reduction of the hard asphalt and also conveys it to storage. Link-Belt conveyors and elevators are employed exclusively throughout the plant.

The officers of this new company are: P. M. Dietz, president and secretary and John G. Ehrlich, vice-president and treasurer. Mr. Ehrlich is also president of the Southern Silica Mining & Mfg. Co., with plants at Dixiana and Summitt, S. C., and of the Sand Drying Co., Charleston, S. C. The plant operated by the latter company was recently completely destroyed by fire but has since been rebuilt and is now again in full operation.

BOARD OF TRUSTEES OF THE CEMENT INSTITUTE, 1934

District	Members of Board	Member of Code Authority	Company Connection
	(1) Members Chosen by Districts [Code: Art. IV, A, 1, (a)]		
1	FRANK H. SMITH		Lawrence Portland Cement Co., New York, N. Y.
2	JOHN J. PORTER		North American Cement Corp., New York, N. Y.
3	H. D. RAFF		Diamond Portland Cement Co., Middle Branch, O.
4	A. J. ROONEY		Huron Portland Cement Co., Detroit, Mich.
5	B. H. RADER[1]	×	Lehigh Portland Cement Co., Chicago, Ill.
6	M. C. MONDAY	×	Hermitage Portland Cement Co., and Cumberland Portland Cement Co., Knoxville, Tenn.
7	C. B. CONDON		Hawkeye Portland Cement Co., Des Moines, Iowa.
8	L. T. SUNDERLAND	×	Ash Grove Lime & Portland Cement Co., Kansas City, Mo.
9	C. BAUMBERGER, JR.		San Antonio Portland Cement Co., San Antonio, Tex.
10	CHARLES BOETTCHER		Ideal Cement Co., Denver, Colo.
11	R. B. HENDERSON		Pacific Portland Cement Co., San Francisco, Cal.
12	E. P. LUCAS	×	Superior Portland Cement Co., Seattle, Wash.
	(2) Members Chosen at Large [Code: Art. IV., A, 1, (b)]		
	B. F. AFFLECK		Universal Atlas Cement Co., Chicago, Ill.
	GEORGE F. COFFIN	×	Nazareth Cement Co., Nazareth, Pa.
	C. L. HOGAN	×	International Cement Corp., New York, N. Y.
	J. B. JOHN	×	Medusa Portland Cement Co., Cleveland, O.
	SMITH W. STOREY		Consolidated Cement Corp., and Florida Portland Cement Co., Chicago, Ill.
	JOSEPH S. YOUNG		Lehigh Portland Cement Co., Allentown, Pa.
	(3) Government Representative [Code: Art. IV, A]		
	C. T. HARRIS	×	National Recovery Administration, Washington, D. C.

[1] Chairman of Code Authority.

MEN OF THE INDUSTRY

WILLIAM E. HILLIARD

WILLIAM E. HILLIARD, general manager of the New Haven Trap Rock Co. of New Haven, Conn., was born in Clinton, Conn., in 1877. After graduating at Yale University in 1899 he taught for several years. From 1903 to 1913 he was engaged in the lumber business in New Haven, then for several years in the masons' supplies business. In 1918 he began his work with the New Haven Trap Rock Co. Besides being an officer and director in that company he is also vice-president and general manager of the Branford Steam Railroad Co. Mr. Hilliard is a director of the National Crushed Stone Assn. He is well-known in credit and accounting circles, having served his city and state as president and as chairman of various credit and accounting organizations.

Personal Mention

P. J. Freeman, former consulting engineer, Pittsburgh Testing Laboratories, and chief engineer of tests and specifications, Dept. of Public Works, Allegheny County, Pa., is now Principal Materials Engineer, Engineering Service Division, Tennessee Valley Authority, Knoxville, Tenn.

Louis Sceurman, master mechanic and shop superintendent for the Universal Atlas Cement Co., Hudson, N. Y., was presented with a 25-yr. service medal by Supt. R. A. Dittmar at a brief ceremony at the plant recently.

H. B. Biehn, formerly of Kenton, O., has been named president and general manager of Blue Rock, Inc., Washington Court House, O.

Fred M. Butler, superintendent of the gravel plant of the Wm. Nading Grain Co., Shelbyville, Ind., has announced his candidacy for the office of sheriff of Shelby County.

Robert A. Young has been elected a director of the Lehigh Portland Cement Co., Allentown, Pa., to fill the vacancy caused by the death of Gen. Harry C. Trexler. All other directors were re-elected.

Oscar Davis, superintendent of the plant of the Lehigh Portland Cement Co., Mason City, Ia., since its opening in 1910, has resigned because of ill health. H. W. Patterson, his former assistant, succeeded to this position.

Daniel Foley, 77, vice-president of the Moulding-Brownell Co., Chicago, Ill., died April 19 at his home in that city. Mr. Foley was a pioneer in the crushed-stone industry and was for many years president of the Federal Stone Co.

Joseph E. Mills, 39, head of the Cebu Portland Cement Co. in the Philippine Islands, died April 6 after a week's illness from typhoid fever. Mr. Mills was financial adviser to Governor-General Frank E. Murphy of the Philippine Islands and also held important positions in many government-operated concerns in the islands.

Kay I. Church, 36, an engineer for the Portland Cement Assn., with headquarters in Wichita, Kan., was killed April 2 in an automobile accident near Marion, Kan.

Christopher Minsinger, president of the Star Sand Co., Portland, Ore., died recently.

Maurice Viernow, 81, pioneer quarryman of the Southwest, died at his home in Carthage, Mo., recently. His body was sent to St. Louis, Mo., his former home, for burial. He was born June 20, 1852, in Bremen, Germany, and came to America with his parents when 12 yr. of age. He was part owner of the Carthage Marble & White Lime Co. in 1877 and severed his connection with that company to organize the Carthage Quarry & Construction Co. in 1891, and in 1895 the Carthage Superior Limestone Co. In 1906 he established what was said to be the first crushed-stone plant in the Carthage district.

Paul Miller, 43, proprietor of a stone quarry near Mifflinburg, Pa., and a well-known business man of that city, was killed recently when a blast was detonated prematurely at the quarry.

Colorado Producers Make Denver, Pueblo Permissive

Colorado aggregates producers, following a public hearing held on March 16, has completed a study of the production facilities of the state and have determined upon two "permissive" areas, which are defined as follows:

Denver Area.—Bounded by line beginning at the southeast corner of Sec. 18, T. 6 S, Range 65 W; thence westerly to the southwest corner of Sec. 16, T. 6 S, Range 70 W; thence northerly to the northwest corner of Sec. 28, T. 1 S, Range 70 W; thence easterly to the northeast corner of Sec. 30, T. 1 S, Range 65 W; thence southerly to the point of beginning.

Pueblo Area.—Bounded by a line beginning at the southeast corner of Sec. 35, T. 22 S, Range 63 W; thence westerly to the southwest corner of Sec. 32, T. 19 S, Range 66 W; thence easterly to the northeast corner of Sec. 2, T. 19 S, Range 63 W; thence southerly to the point of beginning.

In both areas the "permissive" area provisions are to apply to all the products of the crushed-stone, sand-and-gravel and slag industries, "except surfacing material, produced to conform with Colorado State Highway specifications and U. S. Bureau of Public Roads specifications for use on projects located outside of the city limits" (Denver and Pueblo). "Surfacing material is defined as mineral aggregates that enter into the surfacing of any road or street."

▼ *Coming Events* ▲

May 9-10, 1934, Chicago, Ill.—Twelfth Annual Midwest Safety Conference, National Safety Council, Sherman Hotel, Chicago.

May 23-25, 1934, Chicago, Ill.—Sixteenth Annual Convention of the National Lime Assn. and general conference of the lime industry, Edgewater Beach Hotel, Chicago.

December 6-7, 1934, Washington, D. C.—Fourteenth Annual Meeting of the Highway Research Board of the National Research Council, National Research Council Bldg., Washington.

Code May Cover Makers of Bituminous Materials

Gen. Hugh S. Johnson, Administrator of the National Recovery Act, has granted a petition of the cold-laid bituminous-material manufacturers that they be permitted to set up a special division under the approved code for the crushed-stone, sand-and-gravel, and slag industries. The petition was based on the contention that under the original code, the cold-laid bituminous-material manufacturers had no voice in the administration of the compact or in the selection of its code authority.

A formal hearing, at which no substantial opposition to granting the petition was expressed, was held in Washington Feb. 1. Deputy Administrator C. L. Hickling, and Assistant Deputy Administrator R. E. Plimpton, who sat as co-chairmen, recommended favorable action.

Stephens-Adamson Reopens Sales Offices

The Stephens-Adamson Mfg. Co., Aurora, Ill., has reöpened sales-engineering offices at Pittsburgh, Pa., and Huntington, W. Va. The Pittsburgh office is at 1206 Gulf Bldg. and is under the supervision of Harry W. Banbury. The Huntington office is in charge of D. W. Allen.

Colprovia Roads, Inc., announces that its executive offices will be moved on Feb. 22, 1934, from 247 Park Ave., New York, N. Y., to 183 East Main St., Rochester, N. Y. The laboratory will be continued at the Grand Central Palace Bldg., 480 Lexington Ave.

New Corporations

TRANSIT MIX CONCRETE CO. OF TEXAS, Houston, Tex. Capital $30,000. L. D. McKaughan, Videll McKaughan and Mrs. Abbie McKaughan.

SPECIALTY SAND CORP., Cleveland, O. Capital $10,000. Milton S. Levy, Grace L. Levy, Milton E. Glick, Bernard G. Sterin, Leader Bldg.

APPLETON GRANITE CO., Appleton, Minn. Capital $25,000. W. E. Christopherson, president; L. A. Briggs, secretary-treasurer; F. E. Wright.

PORTABLE GRAVEL CO., Lansing, Mich. Capital $25,000. R. G. Bogue, president; C. F. Harper, secretary; L. W. Wright, treasurer; Howard Lenord, active superintendent; Ard Foster, assistant superintendent. All of these men comprise the board of directors.

INDEPENDENT POTASH & CHEMICAL CO., Carlsbad, N. M. C. Martin Stoddard and F. Horten, Phoenix, Ariz., incorporators. R. A. Chase, statutory agent.

ATLAS SAND & GRAVEL CO., Janesville, Wis. Capital 150 shares @ $100 par value. Frank A. and Edwin C. Schultz, incorporators.

LANCASTER GRAVEL CO. (not incorporated), Hookers Station, near Lancaster, O. Paul S. Klyne, 106 E. 13th Ave., and J. B. Clawson, 71 Oakland Park Ave., organizers.

Aggregates Statistics

THE total output of sand and gravel in 1933 reflected further declines in building and highway construction, but the production of glass, molding, and other industrial sands increased sharply. A preliminary estimate based on railway and waterway shipments, data on consuming markets, and partial returns from producers indicates that 71,000,000 short tons of sand and gravel was sold or used by commercial producers during 1933. This quantity represents a decline of 17 per cent. from the comparable figure of 85,289,076 short tons for 1932. Less complete data are available to estimate production by noncommercial operations, which amounted to 34,748,821 short tons in 1932, but partial returns from states and counties indicate a drop of about 5 per cent. in 1933 to 33,000,000 short tons. Salient statistics of the sand-and-gravel industry in 1932 and estimates for 1933 are summarized in Table I.

By H. H. HUGHES and M. ALLAN
Bureau of Mines, Department of Commerce

Railway Shipments Continue to Decline.—Railway shipments of sand and gravel in 1933 amounted to only 21,818,298 short tons, which was a drop of 24 per cent. from 1932. This decline, at a rate greater than the drop in commercial production, indicates increased use of truck transportation, continuing a pronounced trend observable since 1928. Glass and molding sand and nonrevenue railroad ballast are not included in the statistics of railway shipments; they have been excluded from the Bureau of Mines figures in Table II to insure comparability. Production by noncommercial operations—states, counties, and municipalities—also has been excluded because virtually all this type of material is used locally and transported by truck.

In 1928, the first year that the Interstate Commerce Commission adopted its present freight-commodity classification, 52.8 per cent. of the sand and gravel accounted for was shipped by railways. By 1931 the quantity had dropped to 47.3 per cent. of the total, and in the next year to only 37.8 per cent. This sharp decline in part reflects an increase of 42 per cent. in noncommercial production of sand and gravel, virtually all which is moved by truck and part of which may have entered markets previously supplied by railway-shipping plants. In 1933 preliminary figures indicate that railway shipments comprised 36.1 per cent. of the sand and gravel production used in making the comparisons.

Table II—RAILWAY SHIPMENTS OF SAND AND GRAVEL COMPARED WITH COMMERCIAL PRODUCTION, 1928-33.

	1928	1929	1930	1931	1932	1933[1]
Sand and gravel sold or used by producers (excluding glass and molding sand, railroad ballast, and noncommercial production) ..... *short tons*	162,345,291	164,457,419	149,009,430	113,258,809	76,156,192	60,480,000
Shipments of sand and gravel on Class I railroads[2] *short tons*	85,667,157	81,408,069	73,983,841	53,562,437	28,764,827	21,818,298
Shipments by railways..... *per cent.*	52.8	49.5	49.7	47.3	37.8	36.1

[1] Figures subject to revision. [2] Interstate Commerce Commission.

Noncommercial Production. — Production of sand and gravel by states, counties, and municipalities apparently dropped slightly in 1933 compared with 1932. Partial returns from producers are the only available data on which to base this estimate. State highway departments, which accounted for about half of noncommercial production in 1932, reported 20 per cent. less material in 1933. On the other hand, nearly 200 counties not previously heard from reported 5,000,000 short tons. Some of these counties produced sand and gravel for the first time in 1933, but others in the group may have been producing in past years without reporting their output to the Bureau of Mines. The net result of these returns is a preliminary estimate of 33,000,000 short tons of sand and gravel produced by noncommercial operations. This is a drop of 5 per cent. from 1932, but this figure may be subject to considerable revision when all the reports have been received and tabulated.

Not enough data are available to make a breakdown of the material by uses or to estimate average prices.

Industrial Sands Active.—Glass-sand production in 1933 was about 33 per cent. higher than in 1932. This was expected because legalization of beer and prohibition repeal had created an increased demand for glass containers, and a spurt in automobile production

(Continued on page 44)

Table I—SALIENT STATISTICS OF SAND AND GRAVEL SOLD OR USED IN THE UNITED STATES, 1932-33, BY USES.

USE	1932		1933[1]			
	Amount (*short tons*)	Value per Ton	Amount (*short tons*)	Value per Ton	Percentage of change in: Tonnage	Percentage of change in: Value per Ton
COMMERCIAL OPERATIONS						
Sand:						
Glass	1,370,255	$1.65	1,820,000	$1.68	+33	+2
Molding	1,118,146	.94	1,700,000	.98	+52	+4
Building	14,597,631	.51	13,500,000	.50	−7	−2
Paving	17,194,553	.44	11,500,000	.49	−33	+11
Grinding and polishing	419,691	1.52	710,000	1.50	+69	−1
Fire or Furnace	36,698	1.48	95,000	1.20	+160	−19
Engine	1,151,011	.60	1,150,000	.62	...	+3
Filter	68,035	1.36	25,000	1.75	−63	+29
Others[2]	4,486,655	.33	2,500,000	(3)	−44	(3)
Total sand	40,442,675	.53	33,000,000	.58	−18	+9
Gravel:						
Building	13,064,368	.73	13,000,000	.70	...	−4
Paving	25,137,550	.59	18,000,000	.61	−28	+3
Railroad ballast[4]	6,644,483	.27	7,000,000	.32	+5	+19
Total gravel	44,846,401	.58	38,000,000	.59	−15	+2
Total sand and gravel	85,289,076	.56	71,000,000	.59	−17	+5
NONCOMMERCIAL OPERATIONS[5] Total sand and gravel	34,748,821	.29	33,000,000	(3)	−5	(3)
Grand Total	120,037,897	.48	104,000,000	(3)	−13	(3)

[1] Preliminary estimates, subject to revision.
[2] Includes some sand used for railroad ballast, fills, and similar purposes.
[3] No data are available to estimate these items.
[4] Includes some gravel used for fills and other purposes. The quantity of gravel reported as used exclusively for railroad ballast in 1932 was 5,113,862 short tons valued at 30c. a ton. Includes material produced by railroads for their own use, amounting in 1932 to 2,140,154 short tons valued at 14c. a ton.
[5] Includes material produced by states, counties, municipalities, and other government agencies, directly or under lease.

Latest Portland-Cement Statistics

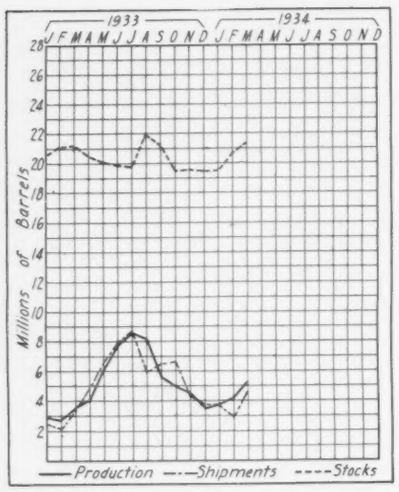


Chart showing monthly production, shipments and stocks on hand at end of month from January, 1933, to March, 1934.

THE Portland-cement industry in March, 1934, produced 5,275,000 bbl., shipped 4,618,000 bbl. from the mills, and had in stock at the end of the month 21,401,000 bbl. of cement. The production in March, 1934, showed an increase of 42.7 per cent. and shipments an increase of 31.6 per land-cement stocks at the mills were 0.5 per cent. higher than a year ago. Total

In the following statement the total output of finished cement is compared with the estimated capacity of 163 plants at the close of March, 1934, and of 165 plants at the close of March, 1933.
cent., as compared with March, 1933.

RATIO (*per cent.*) OF PRODUCTION TO CAPACITY

	March		Feb.	Jan.	Dec.
	1933	1934	1934	1934	1933
The month..	16.1	23.0	20.2	16.6	15.5
The 12 months ended	26.7	25.0	24.4	23.9	23.6

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1933 AND 1934 (*In thousands of barrels*)

Month	Production		Shipments		Stocks At End of Month	
	1933	1934	1933	1934	1933	1934
January	2,958	3,779	2,502	3,778	20,624	19,547
February	2,777	4,168	2,278	2,952	21,125	*a*20,762
March	3,684	5,257	3,510	4,618	21,298	21,401
April	4,183	.....	4,949	.....	20,542	.....
May	6,262	.....	6,709	.....	20,117	.....
June	7,804	.....	7,979	.....	19,936	.....
July	8,609	.....	8,697	.....	19,848	.....
August	8,223	.....	5,994	.....	22,078	.....
September	5,638	.....	6,517	.....	21,216	.....
October	5,037	.....	6,750	.....	19,502	.....
November	4,672	.....	4,463	.....	19,709	.....
December	3,526	.....	3,738	.....	*a*19,541	.....
Totals	63,373	.....	64,086	.....	.....	.....

a Revised.

DISTRIBUTION OF CEMENT (*a*)

Shipped to—	January *a*		February		Shipped to—	January *a*		February	
	1933	1934	1933	1934		1932 *b*	1933 *c*	1933	1934
Alabama	65,810	120,597	44,645	82,660	New Jersey	92,250	84,978	74,419	37,489
Alaska	0	396	0	1,002	New Mexico	10,604	17,361	10,675	18,813
Arizona	5,758	26,984	6,404	27,405	New York	299,193	227,196	186,135	122,717
Arkansas	28,702	38,826	20,009	35,144	North Carolina	20,527	59,997	25,735	85,435
California	248,865	420,939	300,772	344,447	North Dakota	3,041	7,384	3,640	5,313
Colorado	10,805	26,540	28,097	22,046	Ohio	82,682	131,995	79,452	73,047
Connecticut	26,209	24,328	15,195	7,991	Oklahoma	105,220	101,643	122,392	87,120
Delaware	8,899	8,147	3,544	1,493	Oregon	17,283	28,175	13,731	31,114
Dist. of Col	76,511	44,541	63,020	10,794	Pennsylvania	156,684	208,317	148,368	88,759
Florida	35,070	85,609	38,447	79,619	Porto Rico	2,588	7,700	3,315	27,408
Georgia	92,250	76,961	63,004	80,854	Rhode Island	5,636	10,183	4,455	4,606
Hawaii	12,946	12,756	18,175	25,359	South Carolina	7,520	26,218	14,063	18,654
Idaho	2,524	8,096	3,157	11,062	South Dakota	7,068	5,932	6,580	8,830
Illinois	71,367	133,420	115,629	99,658	Tennessee	38,976	98,058	34,645	74,518
Indiana	37,033	68,130	29,925	46,468	Texas	286,316	244,007	202,585	265,706
Iowa	22,087	36,582	27,479	27,418	Utah	3,281	7,739	2,341	10,470
Kansas	55,891	84,581	50,436	82,193	Vermont	2,259	3,741	1,439	3,201
Kentucky	30,128	55,883	29,884	28,290	Virginia	34,550	103,602	42,103	49,682
Louisiana	93,341	99,525	45,045	72,742	Washington	18,587	66,403	23,426	94,457
Maine	3,893	6,711	5,164	3,535	West Virginia	32,661	55,535	35,426	21,323
Maryland	35,046	51,441	27,201	32,436	Wisconsin	22,811	64,953	18,124	42,398
Massachusetts	28,508	69,993	36,663	40,016	Wyoming	3,008	5,673	6,896	4,217
Michigan	38,780	171,041	28,049	85,168	Unspecified	6,802	5,187	0	0
Minnesota	7,518	28,533	36,103	30,219		2,473,844	3,707,827	2,233,403	2,873,218
Mississippi	27,456	50,277	20,639	42,702	Foreign countries	28,156	70,173	44,597	78,782
Missouri	72,845	95,930	62,781	88,749					
Montana	6,082	11,586	5,377	9,675					
Nebraska	10,799	27,642	18,787	29,470	Total shipped from cement plants	2,502,000	3,778,000	2,278,000	2,952,000
Nevada	54,662	244,948	25,640	243,455					
New Hampshire	4,512	4,907	4,187	5,871					

a Includes estimated distribution of shipments from 2 mills in December, 1933 and in January, 1934; from 3 mills in December, 1932 and in January, 1933. *b* Final figures. *c* Compiled from monthly reports of the producers; includes estimated distribution of shipments from 2 to 4 mills each month, and some revisions.

Aggregates (*from page 43*)

resulted in large orders for plate-glass manufacturers. The tonnage reported by companies accounting for 90 per cent. of the output in 1932 indicates that the total production in 1933 amounted to at least 1,820,000 short tons. Prices increased slightly, from $1.65 a ton in 1932 to about $1.68 in 1933.

Increased production of foundry and malleable pig iron and of malleable castings was reflected by a corresponding increase in the demand for molding sand. Available data indicate that the output in 1933 was about 1,700,000 short tons. This represents an increase of 52 per cent. from 1932, and it was accompanied by slightly higher prices.

Grinding and polishing sand and blast sand are used in the dimension-stone and plate-glass industries. The markets for dimension stone were further curtailed in 1933, but the activity in plate-glass plants resulted in an estimated increase of 69 per cent. over 1932 in the production of grinding and polishing sand, or a total of 710,000 short tons. According to partial returns from producers, prices were about 1 per cent. lower than in 1932.

Activity in the steel industry resulted in a sharp increase in the production of fire, or furnace, sand. An estimated increase of 160 per cent. in production to 95,000 short tons was accompanied by a drop of 19 per cent. in prices.

The markets for engine sand in 1933 remained unchanged. The 1933 production is estimated at 1,150,000 short tons, which is virtually the same as the quantity produced in 1932. Average prices were about 3 per cent. higher.

Filter-sand production apparently declined about 63 per cent. in 1933, according to returns from companies reporting more than 80 per cent. of the output in 1932. This sharp drop was accompanied by prices about 29 per cent. higher than in 1932.

Construction Materials Decline.—Building-construction contract awards in 1933 dropped 7.0 per cent. from 1932; engineering construction dropped 12.4 per cent.; concrete paving, 53.4 per cent.; cement shipments, 20.7 per cent.; and the demand for asphalt, 10.3 per cent. In view of the declines recorded in these supplementary data it is logical to find returns from producers indicating that the production of building sand in 1933 amounted to 13,500,000 short tons, a drop of 7 per cent. from 1932. The output of paving sand apparently was only 11,500,000 short tons, representing a decline of 33 per cent. from 1932.

Gravel production held up a little better than that of sand. The output of building gravel in 1933 was about the same as in 1932, amounting to 13,000,000 short tons. Paving-gravel

(*Continued on page 50*)

Traffic News and Comment

Recent I. C. C. Decisions

Crushed Stone.—In response to Fourth Section Application No. 15,130 carriers have been authorized to establish rates on crushed stone from Hillsville, Shaw Junction and Walford, Pa., and on slag from Midland and Sharpsville, Pa., and Weirton, W. Va., to destinations in Ohio, without observing the long-and-short-haul clause of the fourth section, over circuitous routes, the same as those in effect over the short line or route from and to the same points, constructed on the basis prescribed in Rates on Crushed Stone, Gravel, Sand and Slag in Ohio, 191 I. C. C. 206, subject to the usual combination and circuity limitations.—I. C. C. F. S. O. No. 11,542.

Gravel.—In the investigation of the application of emergency charges on intrastate traffic in West Virginia, the Commission in 191 I. C. C. 351 ordered the carriers in West Virginia to maintain rates on sand and gravel in that state on the interstate level, including the emergency charge of 6 c. per ton. The Norfolk and Western, in an effort to meet truck competition, agreed with a shipper to reduce the rate on gravel from Kenova to Lavalette, W. Va., from 66 c., which included the emergency charge, to 50 c. per ton. The N. & W. asks the Commission to modify its order to permit this reduction. Having found that this rate was not related to interstate rates in such a way as to be in violation of any of the provisions of the interstate commerce act, the Commission has modified the report accordingly.—I. C. C. Docket No. 25,135, Increases in Intrastate Freight Rates and Charges, Part 13, West Virginia.

Lime.—The carriers who were party to Speiden's I. C. C. No. A-684 have, in response to Fourth Section Application No. 15,227, been authorized to establish and maintain rates over all routes for the transportation of lime, car-load minimum weight 30,000 lb., with lower alterative rates on a car-load minimum weight of 50,000 lb., from Portland, Ga., and Ragland, Ala., to destinations in southern territory, without observing the long-and-short-haul provisions of the fourth section, subject to intermediate, combination and circuity conditions and limitations contained in fourth-section order No. 9,293, as modified.—I. C. C. F. S. O. No. 11,543.

New Complaints Filed

Cement.—Reparation is sought on an allegation of violation of Sec. 1 and 15 in connection with shipments of Portland and hydraulic cement from Dewey, Okla., to Kilgore, Mart, Arp, Burkburnett and Waco, Tex., in I. C. C. Docket No. 26,421, Dewey Portland Cement Co., Kansas City, Mo. *v.* I.-G.-N. *et al.*

Lime.—The Commission has suspended schedules in Supplement No. 15 to C. B. & Q. I. C. C. No. 16,935, proposing to cancel the commodity rates on lime in carloads and to substitute therefor Class C rates from points on the C. B. & Q., and connecting lines in South Dakota to destinations in Colorado, Nebraska and Wyoming on the C. B. & Q., the Colorado & Southern, Great Western Rwy., the Rapid City, Black Hills & Western R. R. and the Wyoming Rwy. The proposed schedules result in increases, and in some cases amount to more than doubling the rates.—I. C. C. I. & S. Docket No. 3,976.

Sand.—Reparation is sought on an allegation of unreasonable rates on molding sand from points in New York and from Kent, O., to Elgin, Ill., in I. C. C. Docket No. 26,427, Woodruff & Edwards, Inc., Elgin, Ill. *v.* B. & M. *et al.*

Alleging violation of Sec. 1 in connection with shipments of silica sand from Ottawa, Ill., to Houston, Tex., new rates and reparation are requested in I. C. C. Docket No. 26,453, Hughes Tool Co. *et al.*, Houston, Tex. *v.* Burlington-Rock Island *et al.*

Sand and Gravel.—Alleging unreasonable rates on sand and gravel from Riverton, Ind., to Watson, Ill., complainants ask for a cease and desist order and reparation in I. C. C. Docket No. 26,464, Merom Gravel Co., Indianapolis, Ind. *v.* Illinois Central.

Examiners' Reports

Lime.—Examiner E. L. Glenn recommends that the Commission find the rate on common or hydrated lime, from Denie, Ala, to Akron, O., not unreasonable in the past but unreasonable for the future to the extent that it may exceed $5.20 a net ton, car-load minimum weight 50,000 lb., or $6.50 a net ton, car-load minimum weight 30,000 lb.—I. C. C. Docket No. 25,738, Muscle Shoals White Lime Co. *v.* A. & B. *et al.*

Sand.—Upon further hearing Examiner Paul A. Colvin recommends that the Commission award reparation on account of rates found unreasonable in former report in 188 I. C. C. 99.—I. C. C. Docket No. 20,733, Abendroth Bros. *et al. v.* B. & A. *et al.*

Examiner Thurston B. Johnston proposes that the Commission award reparation amounting to $22,696.54 on shipments of sand from Muskegon, Mich., to Westfield, Mass., previously found unreasonable in Industrial Sand Cases, 1930, reported in 188 I. C. C. 99.—I. C. C. Docket No. 22,476, H. B. Smith Co. *v.* N. Y., N. H. & H. *et al.*

Rate-Committee Dockets

New England Freight Assn.

Crushed Stone.—To meet the competition of near quarries shippers propose a reduction in the rate on crushed stone,[1] from Westfield, Mass., to Framingham, E. Holliston and Holliston, Mass., from $1.10 to 90 c. per net ton.—Docket No. 32,444.

Sand and Gravel.—To meet barge competition carriers propose a reduction in the rate on common sand and gravel, car-load minimum weight 60 tons, from Gleasondale, Mass., to Revere, Mass., from 70 c. to 40 c. per net ton.—Docket No. 32,515.

Trunk-Line Assn.

Crushed Stone.—Shippers propose a rate on broken stone or rip rap from Bainbridge, Union Stone Co., Pa., and Bluemont, Md., to Ocean City, Md., of $1.80 per net ton.—Docket No. 32,252.

Dolomite.—Shippers propose commodity rates on roasted dolomite, car-load minimum weight 60,000 lb., from Blue Bell and Williams, Pa., to Bridgeville and Carnegie, Pa., of $2.24 and to Middletown and Portsmouth, O., and Ashland and Newport, Ky., of $3.68 per net ton.—Docket No. 32,155.

Carriers propose a rate on roasted dolomite, car-load minimum weight 60,000 lb., from Millville, W. Va., to Carnegie, Pa., of $1.94 per net ton.—Docket No. 32,155 Sup. 1.

Lime.—Shippers propose the following rates on (A) building and on (B) land or chemical lime, car-load minimum weight 30,000 lb., from Rosendale and Binnewater, N. Y.; to Selvay, N. Y., (A) 13 c., (B) 13c.; to Fairmount, N. Y., to Phelps, N. Y., (A) 15½ c., (B) 14½ c.; to Clifton Springs, N. Y., to Mapleton, N. Y., inclusive, (A) 16 c., (B) 15c. per 100 lb.—Docket No. 32,246.

A reduction in the rate on lime, car-load minimum weight 40,000 lb., from Chazy, N. Y., to Trenton, N. J., to 19 c. per 100 lb., is requested by shippers.—Docket No. 32,250.

Sand.—Shippers propose a rate on industrial sand[1] from Althom, Pa., to Durant City, Pa., of $1.20 per net ton.—Docket No. 32,179.

Sand and Gravel.—A 10 c. reduction in the rate on sand and gravel[1] from Kenvil, N. J., to Allentown, Pa., to 80 c. per net ton is sought by shippers.—Docket No. 32,241.

Central Freight Assn.

Cement.—Carriers propose the publication of a rate on cement, car-load minimum weight 100,000 lb., from East Fultonham, O., to Pomeroy, O., of 6 c. per 100 lb., to apply as a proportional rate on traffic beyond by water to points on Ohio River and its tributaries. The present rate is 9 c..—Docket No. 39,147.

Crushed Stone.—Shippers are asking for a reduction in the rate on crushed stone from Kokomo, Ind., to Tipton, Ind., from 60 c. to 50 c. per net ton.—Docket No. 39,266.

Shippers propose a rate on crushed stone and related articles, from Bluffton, Ind., to Garrett, Ind., of 85 c. per net ton.—Docket No. 39,272.

Crushed Stone, Gravel and Slag.—Shippers at Jackson, Mich., are asking for the establishment of commodity rates on crushed stone, gravel and slag to destinations in Ohio, representative of which are: to Bucyrus, $1.76; to Bryan, $1.19; to Bowling Green, $1.42; to Defiance, $1.42; to Findlay, $1.53; and to Kenton, $1.76 per net ton.—Docket No. 39,191.

Sand and Gravel.—Shippers propose a reduction in the rate on common sand and gravel from Indianapolis, Ind., to Greenfield, Ind., from 65 c. to 35 c. per net ton.—Docket No. 93,311.

Illinois Freight Assn.

Coated Stone.—It is proposed to establish rates on coated crushed stone, sand and/or gravel from Aurora, Ill., to destinations in I. F. A. territory, made by the use of the following mileage scale in Docket No. 3,339-6-A:

Miles	*Rate*	*Miles*	*Rate*
25	$1.16	175	$2.08
40	1.27	200	2.19
60	1.39	225	2.31
75	1.50	250	2.42
100	1.62	275	2.54
125	1.73	300	2.77
150	1.96	325	2.88

Lime.—In lieu of the present rate on lime, from Hannibal, Mo., to Mt. Carmel, Ill., of 19½ c., it is proposed to publish a rate on a car-load minimum weight of 36,000 lb., of 16 c., and on a car-load minimum weight of 50,000 lb., of 13 c. per 100 lbs.—Docket No. 7,752.

Western Trunk-Lines Committee

Lime.—Shippers propose that rates on lime from Louisville, Neb., to destinations Iowa, Minnesota, North and South Dakota and Nebraska be made on the basis of 16 per cent. of the first-class rates. Class C rates are now in effect.—Docket No. 4,357-J.

Southern Freight Assn.

Cement and Lime.—Carriers propose to amend the commodity descriptions of lime and cement to provide that hydraulic lime or dry building mortar of a hydraulic lime, slag, cement, fire clay, ground limestone and/or shale content, will not move on the lime rates, but will move on the cement rates. They also propose to publish the cement basis from all points where there is a movement of dry mortar from which cement rates are not available at the present time.—Docket No. 4,747.

Southwestern Freight Bureau

Cement.—Carriers propose to establish a rate on cement, car-load minimum weight 80,000 lb., from Kansas gas-belt points to Kansas City, Mo., of 8½ c. per 100 lb., to alternate with the present rate of 11 c. on a car-load minimum weight of 50,000 lb.—Docket No. 3,192.

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[1] The car-load minimum weight will be 90 per cent. of the marked capacity of the car except that, when the car is loaded to its full cubical or visible capacity, the actual weight will apply.

Foreign Developments

Rust in Cement Kiln Traced to Kieselguhr

When a dry-process cement kiln at one of the Asland plants in Spain was shut down for repairs, it was discovered that large areas of the kiln shell had been corroded and along the inside of the shell was a quantity of red powder identified as ordinary iron-oxide rust. Various conjectures about the cause of this corrosion, such as the possibility that moisture in the raw material had induced oxidation, were easily rejected, and the phenomenon was finally connected with the use on an insulating lining of kieselguhr (diatomaceous earth) bricks between the refractory and the kiln shell.

Patricio Palomar Collado, manager of Asland's Moncada plant, discussing the occurrence in *Cemento* (February, 1934; 6:36-39) points out that among the catalysts in the contact process of making sulphuric acid are the oxides of iron and silica. It is believed that in the cement kiln a small amount of oxide of iron was formed by a slight rusting of the shell under the influence of moisture in the insulating material when placed in the kiln. Then the silica acted as a catalyst, transforming the sulphurous anhydride resulting from combustion into sulphuric anhydride, which reacted with the water evaporated from the raw material to form sulphuric acid. The sulphuric acid attacked the iron shell, yielding iron sulphate, which was broken down by heat into sulphuric anhydride and iron oxide.

This conclusion is verified by observing the operation of other plants where the sulphur content of the fuel is much greater than that of the fuel used at Moncada, but where no kieselguhr lining is used. The use of acid-resisting paint or coatings of the kiln shell is suggested for use when similar insulating linings are employed.

Investigates Magnesia in Clinker Minerals

Although the tendency of cements containing magnesia to fail in soundness decreases interest in magnesia as a cement material, there is still considerable interest in determining the part magnesia plays in the formation of the clinker minerals. H. E. Schwiete and H. zur Strassen report in *Zement* for March 1 (23:113-116) a study of equilibria in the system CaO-MgO-Al_2O_3-SiO_2, indicating that it is not possible for the magnesia to enter into any mixed crystal or compound in the clinker minerals containing no iron. With the iron-bearing clinker mineral $4CaO.Al_2O_3.Fe_2O_3$ it is possible for the MgO to enter into the compound $4CaO.2MgO.Al_2O_3.Fe_2O_3$, but as the clinker in practice is not in equilibrium, even here the magnesia occurs in its free state.

The destruction of cements high in magnesia is due in almost all cases to the hydration of the MgO, and the rapidity of this reaction is dependent on the burning of the periclase.

Effect of Chlorides and Sulphates on Cement Set

A new study of the effect of salt admixtures on the setting time and on the compressive strength of Portland cement is reported in *Tonindustrie-Zeitung* for March 12 and 15 (58:264-266, 276-278) by Dr. R. Grün and Dr. H. Manecke. The tests were made on the basis of commercial cements with standard setting time, rather than ground clinker without the gypsum admixture. The salt solutions were compared in terms of equal mol concentrations, rather than equal percentages by weight, to correlate the results in terms of the valence of ions.

The investigation showed that the degree of activity in affecting the setting time of Portland cement follows, in the case of the chloride salts, the following order: Mg, Ca, Fe and Al. The Ca-ion and the Al-ion showed an activity greater than would be expected from their valence, which the authors explain as being due to conditions of solubility.

Mixtures of the various salts were for the most part between the individual salts in their effect on setting time. Only the mixture of $CaCl_2$ and $FeCl_3$ had a greater effect on the setting time than either of the individual salts.

Among the sulphates, $MgSO_4$ retards the hardening up to a mol concentration of 1.0, but with the high concentration of 2.0 mol/1 yields a rapid setter. In the case of $Al_2(SO_4)_3$ the Al-ion has a strong accelerating action; in more concentrated solutions than 0.5 mol/1 the retarding action of the SO_4-ion can be observed, although the accelerating effect of the Al-ion prevails.

The compressive strength of Rhine sand 1:3 mortar is reduced by concentrated solutions with a concentration of 1.0 and greater, but in the case of $CaCl_2$ and $AlCl_3$ solutions with lower concentrations, such as 0.5 and 0.25 mol/1, give better strengths than pure water. $CaCl_2$ particularly increases the initial strength after ½ to 1 day of hardening, while the initial strength when $AlCl_3$ is used lags and only exceeds the strength given with pure water after 3 days' hardening.

$FeCl_3$ and $MgCl_2$ are less favorable in their action. The effect of mixtures in this case is also between the effects of the individual salts.

Sulphates of magnesium and aluminum are destructive in their action on the strengths, especially in the case of $Al_2(SO_4)_3$, which, when the Al-ion concentration reaches 1.0, destroys the mortar through cracking.

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Alkalies Offset Action of Organic Impurities

In a note presented to the French Academy of Sciences and reported in *Le Ciment* for March (39:70-71), Augustin Mache verifies the destructive effect of organic materials in sand on cement mortars made from such sand. This destructive action, he finds, seems due to the acid character of the impurities, and is offset to some extent by the presence of an alkali in the mortar, either by using a cement containing a little free lime, or by the addition of soda to the mixing water.

Hydration of Calcium Silicate Reveals Lime

Following up previously-reported studies on the chemical and optical properties of calcium-hydro-aluminate and calcium-sulpho-aluminate isolated from the hydration products of Portland cement *(Jnl. of Soc. Chem. Ind., Japan,* August and November, 1931; *Zement,* 1931, No. 45 and 48), K. Koyanagi in *Zement* 22:705-708 (Dec. 21, 1933) reports similar studies on the hydration of the calcium silicate in Portland cement.

Although Kühl and Tao *(Zement* 1932, No. 8, 9, 10 and 12) found after 7 days and longer periods practically no free lime in the silicate hydration product separated from undecomposed cement, Koyanagi found a fair quantity of free lime in the new compound obtained in almost the same manner. His study leads him to formulate the hydration process of the calcium silicate in the following equations:

$3CaO.SiO_2+4H_2O=CaO.SiO_22H_2O+2CaO(OH)_2$, $2CaO.SiO_2+3H_2O=CaO.SiO_2.2H_2O+Ca(OH)_2$.

Recent Patents

AMERICAN

Concrete

Transit concrete-mixer. Hugh P. Paris, Oakland, Calif., assignor to Paris Concrete Mixer Co., Seattle, Wash. No. 1,919,073.

Closure for concrete-mixer. Joseph Eggert, Columbus, Ohio, assignor to Jaeger Machine Co., same place. No. 1,919,212.

Apparatus for mixing concrete. Wilson A. Jaicks, Chicago, Ill. No. 1,919,220.

Apparatus for mixing concrete. Wilson A. Jaicks. No. 1,919,724.

Concrete-mixer. Frederick E. Mascetti and Americus D. Bruno, Torrington, Conn. No. 1,921,685.

Apparatus for mixing concrete. Wilson A. Jaicks, Chicago, Ill. No. 1,922,368.

Concrete-mixer. Albert Knowles, San Francisco, Calif., assignor to Transit Mixers, Inc. No. 1,922,700.

Conveying

Mine conveyor. Ernst F. Muller, Columbus, Ohio, assignor to Jeffrey Mfg. Co. No. 1,919,302.

Crushing and Pulverizing

Gyratory cone crusher. Edgar B. Symons, Hollywood, Calif., assignor to Nordberg Mfg. Co., Milwaukee, Wis. No. 1,920,488.

Rotary material-reducing machine. John T. Fowler, Columbus, Ohio, assignor to Jeffrey Mfg. Co. No. 1,920,945.

Rotary material-reducing machine. Walter J. Armstrong, Columbus, Ohio, assignor to Jeffrey Mfg. Co. No. 1,920,946.

Rotary material-reducing machine. Walter J. Armstrong, assignor to Jeffrey Mfg. Co. No. 1,920,947.

Pulverizer. Ernest H. Peabody, New York, N. Y., assignor to Peabody Engineering Co., same place. No. 1,921,166.

Excavating

Mining-machine. Morris P. Holmes, Claremont, N. H., assignor to Sullivan Machinery Co. No. 1,922,293.

Mine-car. Armistead R. Long, Scarboro, W. Va. No. 1,922,310.

Loading

Self loading and unloading trolley conveyor. Charles A. McKenny, Detroit, Mich., assignor to Joseph E. Barrett Co. No. 1,922,970.

Method and means for handling excavated material. Louis A. Miller, Kansas City, Mo. No. 1,922,972.

Screening

Vibrating screen. Emil Deister, Fort Wayne, Ind., assignor to Deister Machine Co., same place. No. 1,920,972.

Screening apparatus. Lewis E. Soldan, Buffalo, N. Y., assignor to Productive Equipment Corp., Chicago, Ill. No. 1,919,485.

Apparatus for grading material (sand and like). Damon D. Dunkin, Guion, Ark. No. 1,920,190.

FOREIGN

Blasting and Explosives

Delay-action blasting detonators and the like. L. Mellersh-Jackson (Hercules Powder Co.). British 389,309.

Explosives. A. C. Scott. British 391,881.

Cement and Concrete

Manufacture of a rapid-setting construction material of cement base. H. Opalsky. French 745,145.

Briquet press for briquetting cement raw mix and similar materials. Wilhelm Back, Eriwitte, Westphalia. German 565,116.

Process for neutralizing injurious substances in concrete. Adolf Wolfsholz Zementpresstau, Dusseldorf. German 568,111.

Light-weight concrete. Dipl.-Ing. Franz Roloff, Halle a/S. German 568,197.

Production of very light construction material, using cement, lime, or gypsum. Soc. Anon. pour le Traitement des Minerais Alumino-Potassiques, Geneva, Switzerland. German 568,196.

Production of concrete resistant to sea water. Dr. Ludwig Heynemann. Berlin. German 528,235.

Production of cement. Dr. Max Bertram, Berlin. German 566,198.

Manufacture of hydraulic cement. C. Pontoppidan. British 389,872.

Operation of blast furnaces for the production of iron or iron and cement. Societe Oxythermique. British 390,246.

Burning cement in two stages. Metallgesellschaft A. G., Frankfurt a/M. German 564,947.

Production of colored mortar mixes. Hermann Plauson, Darmstadt. German 563,749.

Cement Concretes. G. S. Eldridge. British 391,582.

Crushing and Grinding

Double stone crusher. A. S. Drammens Jernstöberi & mek. Värksted, Drammen, Norway. German 564,732.

Feeder for cylindrical mills. Friedr. Krupp Grusonwerk A. G., Magdeburg-Buckau. German 564,733.

Centrifugal mill. Turbo-Mill Co., Ltd., San Francisco, Cal. German 564,734.

Hammers for hammer mills. Allgemeine Elektrizitäts-Gesellschaft, Berlin. German 563,581, addition to 516,610.

Grinding elements for tube and like mills. Deutsche Babcock & Wilcox Dampfkessel-Werke A.-G., Oberhausen. German 563,582.

Tube mill with air-current discharge. Humboldt-Deutzmotoren Akt.-Ges., Köln-Kalk. German 563,437.

Hammer mill. Artur Katz, Essen. German 565,287.

Tube mill. Fried. Krupp Grusonwerk A.-G., Magdeburg-Buckau. German 565,446.

Trommel mill fed by air current. Fried. Krupp Grusonwerk A.-G., Magdeburg-Buckau. German 565,575.

Tube mill. Fried. Krupp Grusonwerk A.-G. German 565,643.

Grinding mills. A. E. G. MacCallum. British 391,231.

Edge-runner mills. Winget, Ltd., and H. Martinez. British 391,294.

Jaw Crushers. Nordberg Manufacturing Co. British 391,622.

Drying

Rotary drier with two concentric trommels. Büttner-Werke A.-G., Uerdingen a/Rh. German 563,751.

Apparatus for ventilating and heating drying chambers. Dipl.-Ing. Hartwig Berge, Hersfeld, H.-N. German 565,954.

Stage drier for dust-raising materials. Büttner-Werke A.-G., Uerdingen a/Rh. German 567,725.

Drier for bulk material of all sorts. Arno Andreas, Münster, Westphalia. German 566,331.

Cooler in connection with rotary drier. Büttner-Werke A.-G. German 563,943.

Stationary drier for moist or thick slurry materials. Firma Max Oschatz, Dresden. German 563,944.

Pneumatic drier with ferris-wheel feeder. Rema Rheinische Maschinenfabrik A.-G., Neuss a/Rh. German 564,948.

Shaft for drying, cooling or roasting. Fried. Krupp Grusonwerk A.-G., Madgeburg-Backau. German 565,718.

Gypsum

Method of calcining gypsum. The Gypsum, Lime & Alabastine, Canada, Ltd., Paris, Ont., assignee of George M. Thompson and Leo V. Robinson, Caledonia, Ont. Canadian 330,206.

Beneficiation of anhydride and certain plasters. P. R. A. H. Maureau. French 745,453.

Kilns

Apparatus for drying, calcining, roasting and/or sintering. "Miag" Mühlenbau und Industrie A.G. British 389,975.

Temperature control for electric furnaces. Siemens-Schuckertwerke A.-G., Berlin-Siemensstadt. German 567,817.

Removal of deposits in rotary kilns. Arno Andreas, Münster, Westphalia. German 563,750.

Apparatus for utilizing rotary-kiln waste heat. Arno Andreas, Münster. German 563,884.

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New Machinery and Supplies

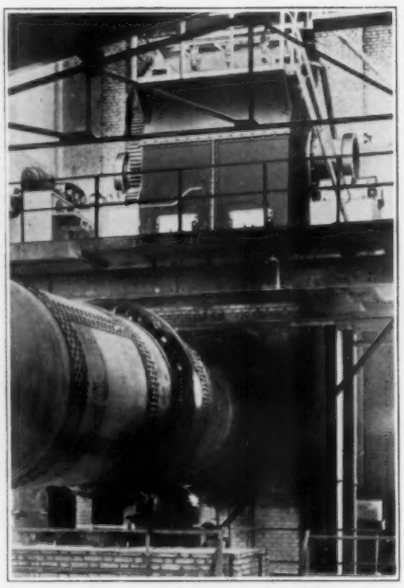
New Machine Reduces Fuel Consumption of Rotary Kilns

It is now one and one-half years since a new device, the so-called "Calcinator" of the Miag Muhlenbau u. Industrie A.-G., Braunschweig, Germany, was introduced for the reduction of fuel consumption on rotary kilns in the cement industry. About seventy-five of these machines are now in successful operation, or are under erection, and several important cement companies have already repeated their orders. This machine has nothing to do with the calcining process in the kiln, "Calcinator" being merely the name applied to this machine.

The principle of this machine consists of the intensive use of the heat contained in the exit gases of the kiln for the drying of the slurry in wet process, and for preheating the raw material in dry process. These processes are taken out of the kiln and performed in the Calcinator by creating in it a very large surface with a large number of filling bodies, while the outside surface of the machine is a very small one.

The Calcinator is installed over the feed end of the kiln, and consists mainly of a slowly rotating drum of about 10 ft. to 13 ft. in diameter and 5 ft. to 10 ft. in width. Instead of a solid shell this drum consists of a circular grate with bars forming openings, spaced about 3 in. apart. This circular grate permits free entrance of the slurry or raw material from the top and discharges it through the lower portion of the drum, and at the same time allows the hot gases to pass through the drum from the bottom in counter-current. The drum is filled to about one-half of its volume with so-called filling bodies, large enough so that they cannot fall through the spaces between the bars, and having the purpose of providing a very large surface to the raw material and to the gases according to the before mentioned principal idea of the new machine. These filling bodies are pieces of pipe about 5 in. in diameter and 5 in. long. The drum is encased by a sturdy steel housing, which, in its lower part where the hot gases enter, is lined with refractory bricks. The drum has a very slow rotation of about 1 r.p.m., and is supported by two trunnion bearings with automatic oil lubrication. Other parts of the installation are the connecting chutes under the Calcinator, connected with the kiln by a sealing device, and a fan with the necessary piping for the hot gases.

In the operation of this machine the raw slurry is pumped to a compensation feed bin over the Calcinator, from which a series of nozzles feed the slurry into the slits between the bars of the rotating



The slurry drier in position above the feed end of the kiln.

drum. The bin has an overflow so that the level of the slurry is always maintained. If for any reason a change in the rate of feed is desired, this can be obtained by the use of different sized nozzles.

A bucket wheel feeder can also be used as its speed may be observed and regulated by the kiln operation. The slurry entering the drum spreads itself very quickly over the slowly moving filling bodies, which are more or less covered by the slurry. The hot gases coming up from the kiln pass through the many always-changing channels of the filling bodies and perform a quick drying of the slurry. This slurry leaves the Calcinator in the form of small nodules.

The operation of the machine is very simple as it consists mainly only of the observation of the temperature of the exit gases leaving the Calcinator, and maintaining them between 200 deg. and 210 deg. F. by adjusting the slurry feed. Working in this way the best operating conditions and the lowest possible fuel consumption are possible, the nodules leaving the Calcinator with only about 5 to 10 per cent. moisture content.

In all Calcinator-equipped kilns it is said that the operation of the kiln has been more regular and uniform, resulting from the fact that the material passing into the kiln from the Calcinator is nodulized and of uniform size. Another incidental feature is that these nodules form into clinker in the same uniform size as they are fed into the kiln from the Calcinator, therefore producing a very uniform small clinker, and positively eliminating the formation of rings inside the kiln.

A further advantage of this small uniform clinker referred to above through the use of a Calcinator is said to be the possibility of cooling it quickly and efficiently, and regaining its heat for use in the burning process. This fact also has a favorable influence on the heat balance.

Another important feature is the savings that can be effected in the grinding department on account of the uniformly small size of the clinker now produced by the kiln.

The simple construction of the machine and its relatively small size is said to permit its application to every kind of existink kiln. Up to the present time the shortest kiln connected with the Calcinator has a length of only 105 ft. and the largest 250 ft., the daily outputs ranging between 500 and 2,400 bbl.

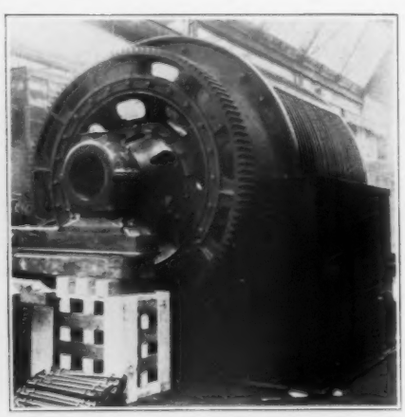
The average fuel saving obtained up to this time in plants where Calcinators are installed is about 25 per cent. of the previous fuel consumption. This saving, of course, depends on special conditions in each case.

In connection with this fuel economy an increase in output also takes place, as now more volume is available inside of the kilns after having taken out the preliminary processes of drying and pre-heating. This increase in capacity depends on the circumstances in each case, and ranges between 15 and 25 per cent.

The power consumption of the Calcinator and the fan is relatively low, and is said to be less than that of a long kiln of the same capacity containing chains and having low temperature in the exit gases, which also need a fan.

The content of dust in the exit gases in relation to the clinker output is practically the same as without the Calcinator, and therefore a good dust chamber or other good dust-collecting system should always be provided if it does not already exist in the plant where a Calcinator is intended to be installed.

The Bradley Pulverizer Co., Allentown, Pa., are the sole distributing agents for Calcinators in the United States, Canada and Mexico.

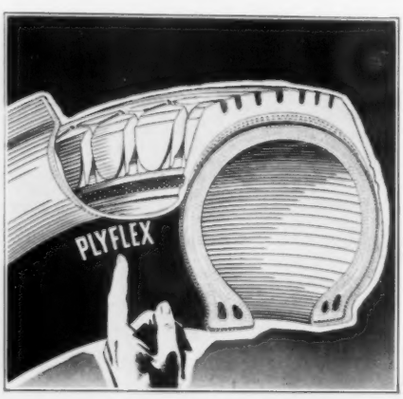


The slurry-drying machine without the hood.

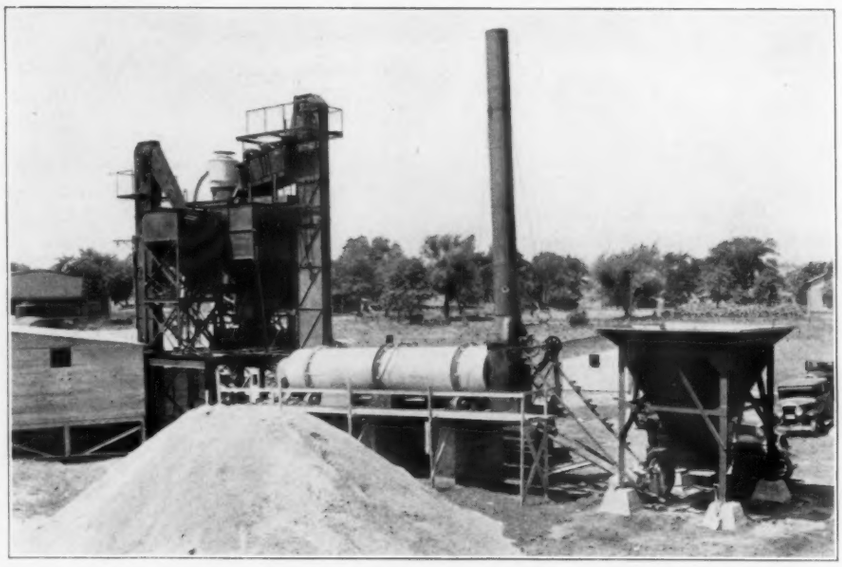
Motor Truck Tire Uses New Type Side-Wall Protection

A newly developed truck and bus tire, with improvements over previous construction, is announced by The B. F. Goodrich Co. as now ready for sale through its nation-wide dealer organization. The new tire known as the Goodrich Triple-Protected Silvertown has three new protection features, Plyflex, Ply-lock and 100 per cent. Full Floating Cords, the manufacturer says.

Plyflex is a new, tough, sturdy rubber material and the new tire has a layer of it protecting the side-wall. This, it is said, bears the brunt of the strains caused by the tire flexing several hundred times a minute, distributes stresses throughout the carcass and prevents local weakness. Ply-lock is a new process of locking the continuous plies of the tire around the bead, anchoring them in place and floating the tapered ply ends in rubber. Its use is said to prevent the plies tearing loose just above the bead. Full Floating Cord fabric



New tire for motor trucks.



Tower-type aggregate-bituminizing plant.

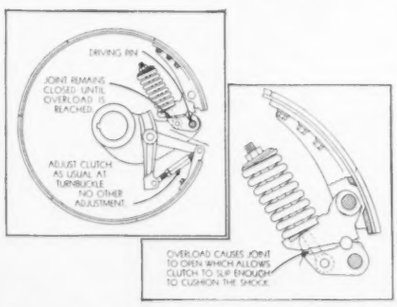
used in the new product is completely "floated-in-rubber," so that every cord is entirely surrounded by rubber. This process, it is claimed, makes it possible to extend the life of the tire, since it runs cooler due to the absence of friction causing cross-cords.

Two other new products, the Gold and Black tube which offers greater resistance to tear and rim chafing and the Seal-O-Matic safety tube, new type puncture-sealing tube for passenger cars, also have been announced by Goodrich in the last several weeks.

Cushion Clutch Reduces Shock on Power-Shovel Hoist Ropes

Engineers of the Northwest Engineering Co., exclusive builders of gasoline, oil and electric-powered shovels, cranes, and draglines, have developed a clutch that, it is said, permits the machine to retain its great power and gives it the cushion of steam. This device is now being offered on the larger sizes of Northwest machines.

The cushion clutch is an overload release in the main clutch of the hoist drum. No matter how tightly it is adjusted it


DRIVING RIM
JOINT REMAINS CLOSED UNTIL OVERLOAD IS REACHED
ADJUST CLUTCH AS USUAL AT TURNBUCKLE NO OTHER ADJUSTMENT
OVERLOAD CAUSES JOINT TO OPEN WHICH ALLOWS CLUTCH TO SLIP ENOUGH TO CUSHION THE SHOCK

Cushion clutch for shovels, cranes and drag-lines.

limits the hoist rope pull to a definite value. With the cushion clutch the full power of the engine is transmitted to the operating functions, but maximum stresses on every part under power are reduced when the hoist rope is tensioned. The natural result is a reduction in maximum loads on the drum shaft, a reduction in clutch adjustment and increased cable life.

In operation, it acts as a cushion against the shocks, permitting the main clutch to slip gently when the overload point is reached. This is said to give the operator from three to five times as long to throw out the main clutch lever to prevent the engine stalling.

Aggregate-Bituminizing Plants Available in Various Sizes

The new tower type plant manufactured by Hetherington & Berner Inc., Indianapolis, Ind., shown in the accompanying illustration is offered in various capacities, with mixers up to 4,000 lb. This plant is equipped with a reciprocating feeder which automatically feeds the material into the cold sand elevator. The material then passes through the internal oil-fired drier, which can be used for making either hot or cold mixes. The hot sand elevator is of the hinged type and remains intact while in transit. The material then goes through a special 3 or 4-deck vibrating screen for classification and then into a compartment storage bin which is mounted on hinged trunnions and drops forward over the mixer platform for shipment.

The plant is equipped with 4-point suspension dial scales from which the aggregate weigh box and A. C. weigh bucket are suspended. The A. C. weigh bucket is the bottom-discharge type and is steam jacketed to meet present day specifications. The mixer is of the twin-shaft pugmill type, steam jacketed and steam operated, and is equipped with blades with removable tips which are adjustable and reversible.

The mixer platform on which the mixer is mounted and the transmission parts remain intact when moving the plant. The plant is readily assembled and disassembled and can be shipped on a railway flat car or hauled by trucks. The plant is also equipped with a special lime-dust-handling unit which also has a hinged type elevator for feeding the lime-dust hopper and is equipped with a screw conveyor to feed the lime dust into the weigh box.

Portable Aggregate-Crushing Plant on Box-Girder Frame

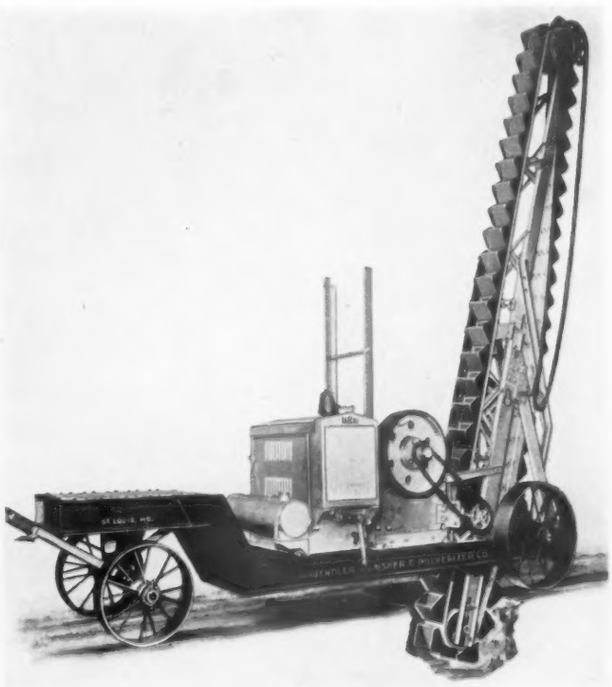
The Gruendler Crusher & Pulverizer Co., St. Louis, Mo., has developed a portable crushing plant which can be used by itself or in connection with various types of screening equipment where a more complete plant is required. The entire unit is mounted on a structural box girder type frame mounted on steel-spoke wheels. The frame is mounted over the front wheels to allow steering the machine when in transit and drops to a low level back of the wheels to give the lowest practical feed elevation to the crusher. The frame is underslung at the rear axle.

The Gruendler jaw crusher is driven by a LeRoi gasoline engine which is fully enclosed and is mounted on the frame next to the crusher. A chain drive from the crusher drive shaft drives a short shaft from which a belt bucket elevator is driven by chain and sprocket through a third chain drive. The first drive shaft is so located that the elevator can be swung on its pivot from its operating position to a horizontal position when the plant is to be moved, without changing the tension in the chain between the first and second drive shafts. Because of this arrangement the plant can be set up or taken down very readily. All that is necessary to put this plant into operation at a new location is to dig a small pit from which the bucket elevator can take the crusher discharge. A steel brace mounted on the frame supports the weight of the elevator when in transit.

Leveling Device and Drill-Centralizer on Wagon-Drill

The Worthington Pump & Machinery Corp., Harrison, N. J., has recently announced the addition of an improved type wagon drill for drilling deep holes in quarries and general rock excavation to its extensive line of rock drills.

The new machine incorporates an adjustable drill steel centralizer which greatly reduces the time and labor necessary in collaring the drill holes. Another feature is the leveling device permitting the adjustment of the drill tower to the vertical position when the rig is set on uneven ground, thus eliminating blocking



Aggregate-crushing plant of new design.

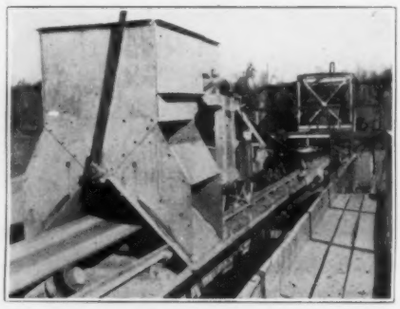
Machine for drilling deep holes.

up of the wheels. Worthy of note is the fact that the drilling engine can be readily demounted from its detachable feed slide and the slab back guide by the removal of two bolts, in no way disturbing the slab back. The machine can be furnished with either an air hoist or a hand winch for raising or lowering the drilling engine and either a hand winch or block and fall for handling the drill steel.

While the standard type is built with three wheels, it can also be furnished with four, for running on transverse track. The three or four wheeled machine is constructed to be converted to skid type if desired. The drilling engine can be furnished for either light or heavy, wet or dry drilling.

Self-Vulcanizing Rubber Resists Abrasive Action

The Self-Vulcanizing Rubber Co., Inc., Chicago, Ill., manufactures "Self-vulc," a self-curing plastic rubber compound used for protection against abrasion and corrosion. This material can be used for lining chutes, tube mills, dredge pumps, and other equipment where resistance to abrasion is an important factor. When used for chute lining it is said to outwear ordinary metal lining many times over. This material can be applied to any surface in a few minutes' time.



Tripper chutes protected against abrasion by rubber lining.

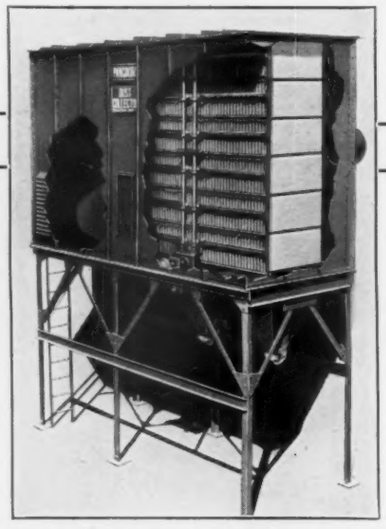
Aggregates (from page 44)

sales, however, dropped 28 per cent. from 1932; the estimated output was only 18,000,000 short tons. Preliminary returns from producers show increased sales of railroad ballast. Production by railroads for their own use, however, declined in 1933. The total ballast production in 1932 probably amounted to about 7,000,000 short tons, an increase of 5 per cent. over 1932.

The average price of building gravel dropped about 4 per cent. in 1933, but paving-gravel prices apparently increased 3 per cent. and railroad ballast prices increased 19 per cent. The net result was an indicated advance of 2 per cent. in the average price of all the gravel accounted for. The weighted-average price of both sand and gravel produced by commercial operations advanced from 56 c. a ton in 1932 to 59 c. a ton in 1933, a rise of 5 per cent.

Higher prices and an increased demand for industrial sands may have been encouraging to some branches of the sand-and-gravel industry, but the continued slump in construction further curtailed the outlets for aggregates which in peak years accounted for more than 75 per cent. of all sand-and-gravel sales.

STUDY THIS NEW «CH» DUST COLLECTOR



Phantom photograph showing interior "clear air" side of new "CH" Collector.

FOURTEEN EXCLUSIVE FEATURES

Here is the outstanding Dust Collector of all time—a mechanical engineering triumph that upsets all present standards of efficiency and low cost maintenance. It is Pangborn's crowning achievement after more than a quarter century experience in manufacturing, testing, inspecting, and servicing all types of Dust Collectors.

A complete, 24 page Bulletin, illustrating and describing every detail of this new collector, has just been received from the printer.

Write for free copy, now.

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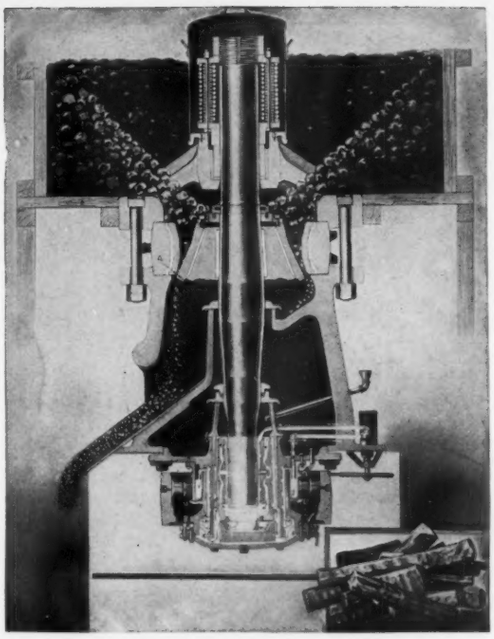


Greater tonnage with half the power cost

Guaranteed!

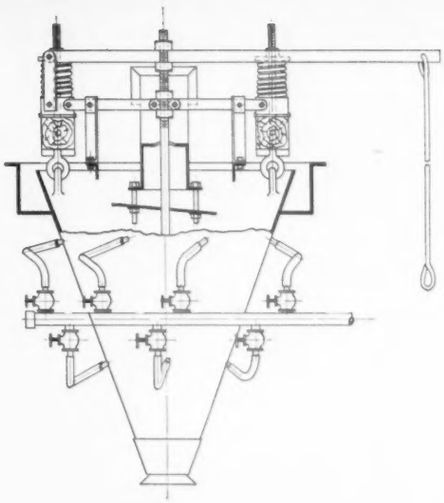
The Kennedy Ball Bearing Gearless Gyratory Crusher is guaranteed to produce a greater tonnage than any other crusher of a given size, with half the power per ton of ore. This crusher can be equipped with a synchronous motor in its pulley, or driven by belt from a standard motor.

The Savings Effected with this crusher are astounding:

In cost of Maintenance.....80%
In Power.....The entire cost of crusher and motor in pulley is amortized annually.

Sieving test on glacial gravel crushed at the rate of 18 tons per hour, with No. 19 crusher set to ⅛ in., and using less than 15 hp., follows:

Minus ⅜ in	100%
Plus 3 mesh	21½%
Minus 3—Plus 4	17%
Minus 4—Plus 14	36½%
Minus 14—Plus 48	15%
Minus 48—Plus 100	4%
Minus 100	5½%



Kennedy Washing Classifier and Dewaterer

In actual operation coarse gravel sand is discharged from bottom of a relatively small container for concrete sand; colloidal material and fine sand laundered to a relatively larger container, the colloidal material is washed over, and the product is discharged through the bottom for plaster sand; or the colloidal material only may be washed over from the first container.

The containers supported on springs with the adjusting lever enable the operator to regulate washing, classifying, and dewatering.

The moisture content has averaged less than 25%; therefore it is truly a washer, classifier, and dewaterer.

These containers will deal with the closest classification in precious metal milling work.

It is a scientific method and accomplishes results heretofore unknown.

Kennedy Vibrating Screen

Double Strength High-Class Workmanship and Material Greatest Capacity Guaranteed

No repair parts sold after 4 years in use except screen cloth.

Write today for our Catalog No. 16-P-534

KENNEDY-VAN SAUN MFG. and ENG. CORP.

Two Park Avenue New York, N. Y.

BRANCH OFFICES:—Chicago: 120 South La Salle St. Birmingham, Ala.: Comer Building. Los Angeles, Calif.: 416 South Spring St. London, England: Bush House. Paris, France: 40 Rue des Mathurins. Johannesburg, S. Africa: 73 Cullinan Bldg. Canadian Agents: The William Kennedy & Sons, Ltd., Owen Sound, Ont. Walkers Limited, Maryborough, Queensland, Australia. New Zealand Agents: Booth, MacDonald & Co., Ltd., Christchurch.

Classified Buyers' Guide

A Directory of PIT AND QUARRY Advertisers Arranged According to Product

Although every effort is made to insure accuracy and completeness in these listings, the publisher cannot accept responsibility for errors or omissions. Any mistakes discovered will gladly be rectified, if brought to the attention of the Advertisers' Service Department.

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*Eagle Iron Works

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Worthington Pump & Mchy. Corp.

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*Pangborn Corp.

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*Pangborn Corp.
Universal Road Machy. Co.

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*Bartlett & Snow Co., C. O.
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*Kennedy-Van Saun Mfg. and Eng. Corp.

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*Bartlett & Snow Co., C. O.
*Kennedy-Van Saun Mfg. and Eng. Corp.

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*Link-Belt Co.
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*Bartlett & Snow Co., C. O.

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*Link-Belt Co.

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*Link-Belt Co.

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*Bartlett & Snow Co., C. O.
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Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
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Morrow Mfg. Co.

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*Kennedy-Van Saun Mfg. and Eng. Corp.
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*Link-Belt Co.
*Pangborn Corp.

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*American Steel & Wire Co.

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*Allis-Chalmers Mfg. Co.
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Barber-Greene Co.
*Bartlett & Snow Co., C. O.
Good Roads Machy. Corp.
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Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Morrow Mfg. Co.
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*Universal Crusher Co.
Universal Road Machy. Co.

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*Bartlett & Snow. Co., C. O.

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*Link-Belt Co.

Couplings (Hose, Pipe, etc.)
Thermoid Rubber Co.

Cranes (Crawler and Locomotive)
*Link-Belt Co.
Ohio Power Shovel Co.

Crusher Parts
*Bartlett & Snow Co., C. O.
*Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.

Crushers (Hammer)
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
*Dixie Machy. Mfg. Co.
Good Roads Machy. Corp.
*Gruendler Crusher & Pulv. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Universal Crusher Co.

Crushers (Jaw and Gyratory)
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
Good Roads Machy. Corp.
*Gruendler Crusher & Pulv. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
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Smith Engr. Works
*Universal Crusher Co.
Universal Road Machy. Co.

Crushers (Ring)
*Bartlett & Snow Co., C. O.

Crushers (Roll)
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
*Gruendler Crusher & Pulv. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
Pioneer Gravel Equipment Mfg. Co.

Crushers (Rotary)
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.

Crushing Rolls
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
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Atlas Powder Co.

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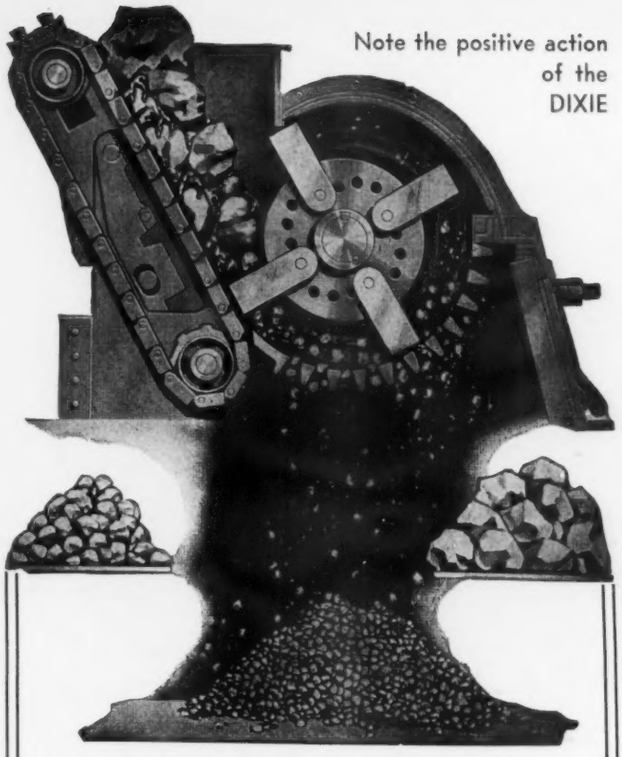
Dragline Cableway Excavators
Good Roads Machy. Corp.
*Link-Belt Co.
*Sauerman Bros., Inc.

Dragline Excavators
*Link-Belt Co.
Ohio Power Shovel Co.
*Sauerman Bros., Inc.

*** See also information in the 1934 Pit and Quarry HANDBOOK.**



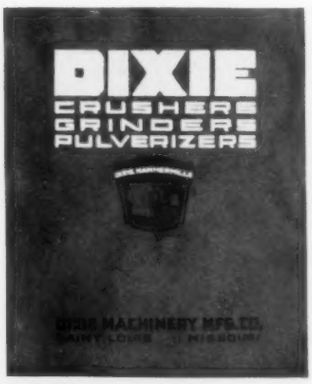
Note the positive action of the DIXIE

DIXIE MOGUL

is the steady running non-clogging hammermill that heavy feeding and hard crushing can't stop.

It is built tough in every part. The special moving breaker plate is 26 times average wearing area. Other details are husky in proportion, insuring long service life and low maintenance cost.

DIXIE is doing its part to reduce crushing costs to rock bottom levels on public works projects. You need the DIXIE to bring you bigger profits on the next job. Available in forty sizes for any capacity in primary, secondary or fine reduction.

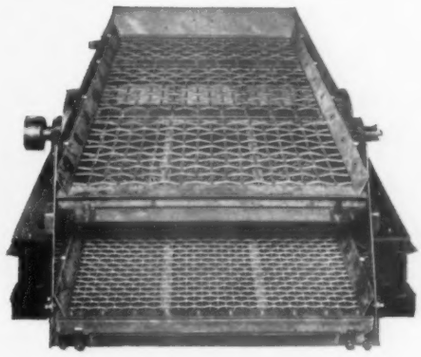


Write for your copy of this 32-page catalog on modern crushing methods. It will show you the way to large savings.

DIXIE
MACHINERY MFG. CO.
4209 GOODFELLOW AVENUE, ST. LOUIS, MO.

ROK-TEX

50% to 200% longer screen life



Mechanical Screen with "Buffalo" Wire ROK-TEX installed complete.

YOU need only watch ROK-TEX on the job under the most gruelling service to see why it has a reputation for economy. It keeps "going strong" long after ordinary screens have "passed out" of commission. In screening sharp stone—the acid test for wire cloth—it shows from 50% to 200% longer screen life according to actual reports from users.

Its extra durability is in the making—its high quality special alloy abrasion-resisting wire, hot dipped galvanizing after weaving where required is your assurance of rock bottom screening costs.

The square mesh of ROK-TEX is correct in principle and efficient in practice. In screening sand, gravel or stone, it gives full capacity, insures accurate sizing, and eliminates uneven wear—vastly superior to the round (punched) type of screen in greater output and lower upkeep.

You can get ROK-TEX in all size meshes for all purposes for every conceivable job in quarry or pit. Send your sizes and specifications for our prices.

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526 Terrace Buffalo, N. Y.
Philadelphia Branch: 11 S. 7th St.
Philadelphia, Penna.

ROK-TEX

Classified Buyers' Guide

A Directory of PIT AND QUARRY Advertisers Arranged According to Product

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*Morris Machine Works

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Worthington Pump & Mchy. Corp.

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*Kennedy-Van Saun Mfg. and Eng. Corp.
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*Link-Belt Co.

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*Link-Belt Co.

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*Bartlett & Snow Co., C. O.
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*Hendrick Mfg. Co.
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Hetherington & Berner, Inc.
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*Bartlett & Snow Co., C. O.
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*Bartlett & Snow Co., C. O.
*Link-Belt Co.

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*Bartlett & Snow Co., C. O.
*Kennedy-Van Saun Mfg. and Eng. Corp.

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*Bartlett & Snow Co., C. O.
Good Roads Machy. Corp.
Haiss Mfg. Co., Geo.
*Link-Belt Co.

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*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
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*Kennedy-Van Saun Mfg. and Eng. Corp.
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*Deister Concentrator Co.

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*Deister Concentrator Co.

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*Allis-Chalmers Mfg. Co.
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Hetherington & Berner, Inc.

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Barber-Greene Co.
Haiss Mfg. Co., Geo.
*Link-Belt Co.

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*Bartlett & Snow Co., C. O.
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*Gruendler Crusher & Pulv. Co.
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*American Steel & Wire Co.

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*Bartlett & Snow Co., C. O.
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*Kennedy-Van Saun Mfg. and Eng. Corp.
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*Bartlett & Snow Co., C. O.
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*Universal Crusher Co.

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*Morris Machine Works

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Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
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Hetherington & Berner, Inc.
Kansas City Hay Press Co.
*Morris Machine Works
Worthington Pump & Mchy. Corp.

Pumps (Dredging)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Erie Pump & Engine Works
Hetherington & Berner, Inc.
*Morris Machine Works
Worthington Pump & Mchy. Corp.

Pumps (Sand and Gravel)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Erie Pump & Engine Works
Hetherington & Berner, Inc.
Kansas City Hay Press Co.
*Morris Machine Works

*** See also information in the 1934 Pit and Quarry HANDBOOK.**

New!

More Capacity!

Lower Costs!

Positive Uniformity!

Greater Efficiency!

The capacity of grinding mills is materially increased by this new Gayco Centrifugal Air Separator. Fines are removed as they are made.

It delivers an absolutely uniform product of any fineness desired from 60 to 400 mesh with greater capacity and lower power cost than is possible with any other type of air separator.

It is slow speed, requiring very little power. Repair costs are practically nothing—the only wearing parts are the steel cut gears and bearings enclosed in a dust proof casing.

Send for further details—

RUBERT M. GAY

Division, Universal Road Machinery Company

114 Liberty St. New York, N. Y.

Crushing, Screening, Washing

equipment—Reliance—in capacities from 50 to 1500 tons per day. Built with simplicity of design for long hard service with low maintenance costs. Send for catalog and full information.

Universal Road Machinery Co.

Kingston, N. Y.

The New Chrysler AIR COMPRESSOR

SAVES in First Cost . . .

SAVES in Operating Cost

During the recent season a Chrysler 136-foot air compressor replaced a standard 220-foot machine that had been used for mud-jack work in raising sunken roads.

This compressor was called upon to operate a rock drill to drill the necessary holes, a concrete breaker for relieving binding at the joints, and for the actual pumping of mud in order to raise the low spots.

The Chrysler compressor handled all this work just as effectively as the larger compressor and operated on 10 gallons of gas per day, one-third of the amount required by the larger and much costlier compressor.

This is but one example of many instances in which the new Chrysler air compressor proved its worth. Write for further details and specifications.

CHRYSLER MOTORS

AMPLEX DIVISION

DETROIT, MICHIGAN

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Ready-Mixed Concrete Plants
*Bartlett & Snow Co., C. O.

Rock Drills (See Drills—Rock)

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Rust Protection
Self-Vulcanizing Rubber Co.

Safety Appliances
*Pangborn Corp.

Sand-Blast Equipment
*Pangborn Corp.

Sand Separators
*Bartlett & Snow Co., C. O.
*Link-Belt Co.
McLanahan and Stone Corp.
Pioneer Gravel Equipment Mfg. Co.
Smith Engr. Works

Sand-Settling Tanks
*Bartlett & Snow Co., C. O.
Good Roads Machy. Corp.
*Link-Belt Co.
Pioneer Gravel Equipment Mfg. Co.
Smith Engr. Works

Scrapers (Power Drag)
*Link-Belt Co.
Pioneer Gravel Equipment Mfg. Co.
*Sauerman Bros., Inc.

Screens
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
Buffalo Wire Works Co.
Chicago Perforating Co.
*Deister Concentrator Co.
Deister Machine Co.
*Eagle Iron Works
Gay, Rubert M.
Good Roads Machy. Corp.
*Gruendler Crusher & Pulv. Co.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Morrow Mfg. Co.
National Wire Cloth Co.
Pioneer Gravel Equipment Mfg. Co.
Productive Equip. Corp.
Smith Engr. Works
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Universal Road Machy. Co.

Screens (Vibrating or Shaking)
*Allis-Chalmers Mfg. Co.
Barber-Greene Co.
*Bartlett & Snow Co., C. O.
Buffalo Wire Works Co.
*Deister Concentrator Co.
Deister Machine Co.
Good Roads Machy. Corp.
*Gruendler Crusher & Pulv. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Pioneer Gravel Equipment Mfg. Co.
Productive Equip. Corp.
Smith Engr. Works
*Universal Crusher Co.

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Sheaves
*Allis-Chalmers Mfg. Co.
*Eagle Iron Works
*Gruendler Crusher & Pulv. Co.
Haiss Mfg. Co., Geo.
Hetherington & Berner, Inc.
*Link-Belt Co.
McLanahan and Stone Corp.

Shovels (Electric, Internal Combustion and Steam)
*Link-Belt Co.
Ohio Power Shovel Co.

Skip Hoists and Skips
*Allis-Chalmers Mfg. Co.
*Bartlett & Snow Co., C. O.
Hetherington & Berner, Inc.
*Link-Belt Co.

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Spouts (See Chutes and Chute Liners)

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*Deister Concentrator Co.

Sprays (Paint)
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Steel Grating (See Grating, Steel)

Steel Inclines (See Inclines, Steel)

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Hetherington & Berner, Inc.

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Haiss Mfg. Co., Geo.
*Link-Belt Co.
*Sauerman Bros., Inc.

Sweeping Systems
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Tanks
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*Hendrick Mfg. Co.

Tanks (Sand-Settling)
*Bartlett & Snow Co., C. O.
Good Roads Machy. Corp.
*Link-Belt Co.
Morrow Mfg. Co.
Pioneer Gravel Equipment Mfg. Co.
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Tools (Drill) (See Drilling Accessories)

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*American Steel & Wire Co.

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Transmission Machinery
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*Bartlett & Snow Co., C. O.
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*Bartlett & Snow Co., C. O.
Good Roads Machy. Corp.
*Link-Belt Co.

Truck Cranes (See Cranes)

Truck Mixers
*Bartlett & Snow Co., C. O.

Trucks and Trailers (See Motor Trucks)

Tube-Mills (See Mills—Ball, Tube, etc.)

Underground Loaders
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*Bartlett & Snow Co., C. O.

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Barber-Greene Co.
*Bartlett & Snow Co., C. O.
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Chicago Perforating Co.
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Vibrating Screens (See Screens—Vibrating)

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*Bartlett & Snow Co., C. O.
*Eagle Iron Works
Good Roads Machy. Corp.
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Pioneer Gravel Equipment Mfg. Co.
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Worm Gears (See Gears and Pinions)

* See also information in the 1934 Pit and Quarry HANDBOOK.

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Heat-Treated
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with square, round and "Sqround" perforations. Write for data, particularly on the new "Sqround" Mesh.

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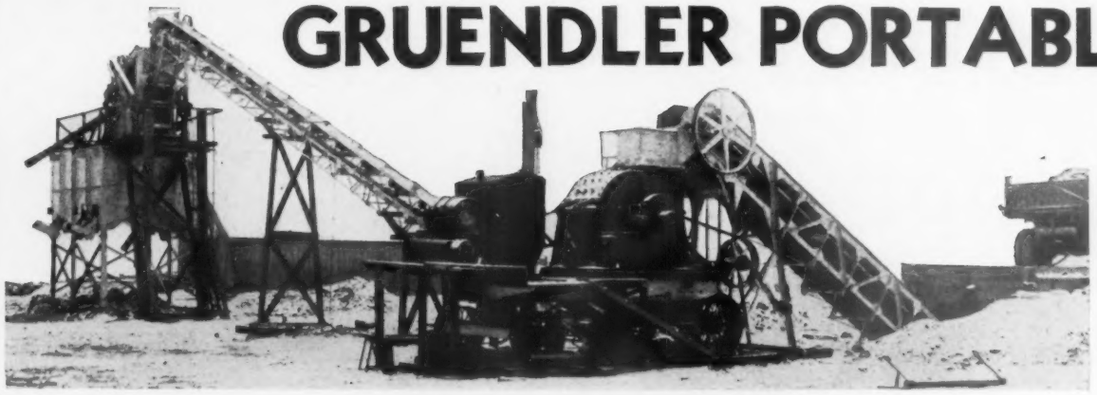
GRUENDLER PORTABLES



Gruendler portable plant at Weaver Stone Quarry, crushing 1200 tons per day of 3-inch and 400 tons of ¾-inch aggregate material. One reduction.

DEPENDABLE performance and outstanding economy are winning scores of new friends for Gruendler portable gravel crushing and rock crushing plants.

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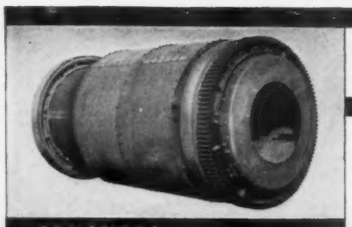

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DRYERS
SKIP HOISTS
ELEVATORS
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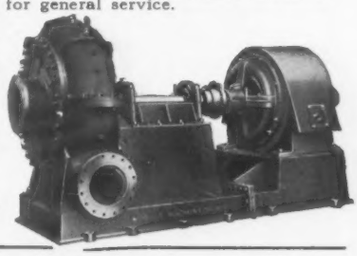

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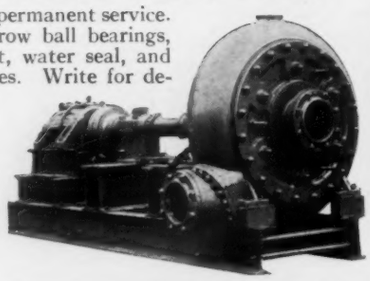

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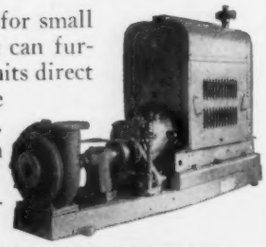

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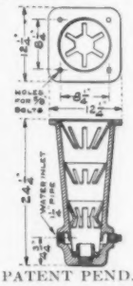
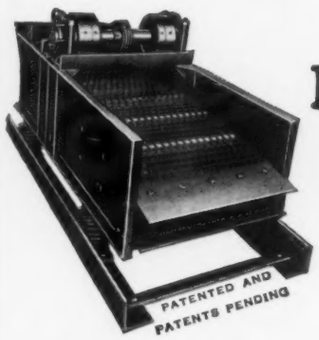


PATENT PEND.

Write for Bulletin No. 23 just off the press



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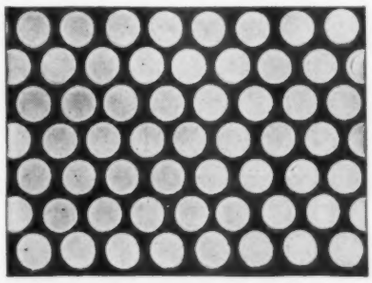

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Prices are right.
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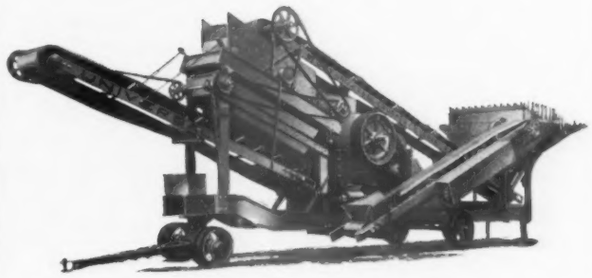

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2–600	G. E. sl. rg.	252
600	G. E. syn.	257
600	Al. Ch. syn.	240
3–675	Al. Ch. syn.	900
400	West. sl. rg.	514
400	Al. Ch. syn.	300
300	Al. Ch. sl. rg.	585
260	Al. Ch. syn.	720
250	West. sl. rg.	720
200	G. E. sl. rg.	1200
200	West. sl. rg.	500
200	F. M. sl. rg.	600
150	G. E. sl. rg.	1750
150	G. E. sq. c.	1750
100	Cr. Wh. syn.	225

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1–14,000 G.P.M., 60′ Hd., dir. conn. 260 hp., Al. Ch. 720 r.p.m.

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2—No. 7 McKiernan-Terry Hammers.
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2 Late Type Jordan Air Operated Spreaders.
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1—No. 7½ McCully Crusher.
1—No. 6 Smith Crusher.
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Several Jaw Crushers.
Gas and Electric Motors, 1 HP to 200 HP.
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Crusher—McCully 10" reduction.	
Crusher—American No. 40 S. R.	
Goodman U/G Mining Shovel No. 48, Elect Travel	3,500.00
Steel Loading Hopper, 2 tracks	1,000.00
Loco. Crane, Link-Belt Elect., 99', 5-Yd. Bucket	5,000.00
Thew Elect. Shovel, S/G, 4-Wh., 1½ Yd., 1 Yd Dipper.	700.00
Relaying Rails.	

Also Cars, Shovels, Cranes, Pumps, Power Plants, etc.

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Crushers:

1—42x60 Farrell Jaw Crusher, Electric Motor and Texrope drive.
1—36x24 Farrell Jaw Crusher, Gasoline Motor and Texrope drive, new 1932.
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1—Model No. 840, Bakstad, 3-jaw Reduction Crusher, 10 tons per hour, new 1930.

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1—20 x 12 x 14 Chicago-Pneumatic, O.C.E. Elec., 1300 cu.ft., after cooler and Air Receiver, A.C.
2—Ingersoll-Rand, Type XRB, Electric 500 cu.ft. each, 110 HP Motors, A.C.

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1—Barber-Greene Belt Conveyor, 105 ft. centers, 24" wide.
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1—Robins Belt Conveyor, 250 ft. centers, 36" wide.
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2—Sanderson Cyclone 8" Well Drills, Model S.R. No. 14, Electric A.C.

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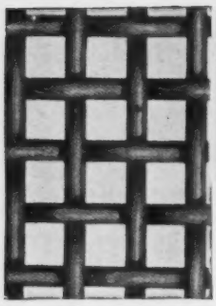

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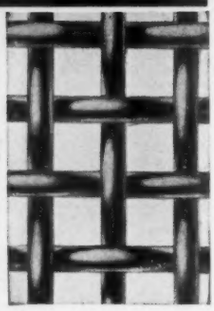

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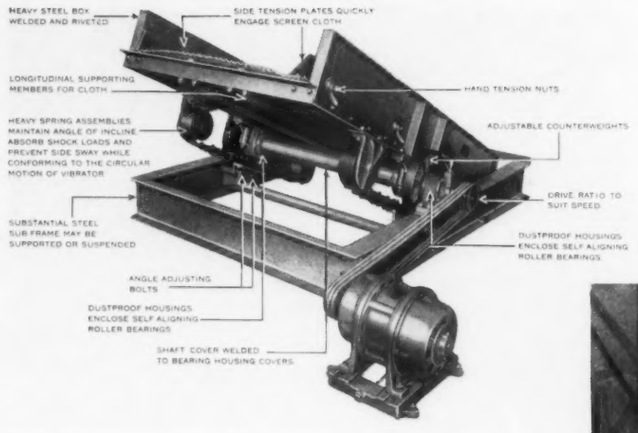
COMPLETE HYDRAULIC DREDGES

SAND AND GRAVEL DREDGING PUMPS
AGITATING MACHINERY
DREDGE HOISTS
STEEL HULLS • PONTOONS
PIPE LINE ACCESSORIES

HETHERINGTON & BERNER, INC.
701-745 KENTUCKY AVENUE -- -- -- -- INDIANAPOLIS, IND.

EFFECTIVE, LOW-COST SCREENING


HEAVY STEEL BOX WELDED AND RIVETED
SIDE TENSION PLATES QUICKLY ENGAGE SCREEN CLOTH
LONGITUDINAL SUPPORTING MEMBERS FOR CLOTH
HAND TENSION NUTS
HEAVY SPRING ASSEMBLIES MAINTAIN ANGLE OF INCLINE ABSORB SHOCK LOADS AND PREVENT SIDE SWAY WHILE CONFORMING TO THE CIRCULAR MOTION OF VIBRATOR
ADJUSTABLE COUNTERWEIGHTS
DRIVE RATIO TO SUIT SPEED
SUBSTANTIAL STEEL SUB FRAME MAY BE SUPPORTED OR SUSPENDED
DUSTPROOF HOUSINGS ENCLOSE SELF ALIGNING ROLLER BEARINGS
ANGLE ADJUSTING BOLTS
DUSTPROOF HOUSINGS ENCLOSE SELF ALIGNING ROLLER BEARINGS
SHAFT COVER WELDED TO BEARING HOUSING COVERS

The Link-Belt Vibrating Screen is truly "a triumph of mechanical vibration." Its efficiency, simplicity of design, high capacity, and long life, make it the ideal screen for low-cost screening of rock products. Made in three general types, for both fine and coarse screening.

The "PD" type, positive drive screen illustrated, is designed for heavy-duty, large-capacity, coarse screening. Equipped with angle changing mechanism. Can be supported from below or hung by cables from above. Screen cloth is quickly and easily detached. Long cushioning springs take shock loads.

5006

LINK-BELT COMPANY

SAN FRANCISCO • TORONTO

CHICAGO • PHILADELPHIA • INDIANAPOLIS

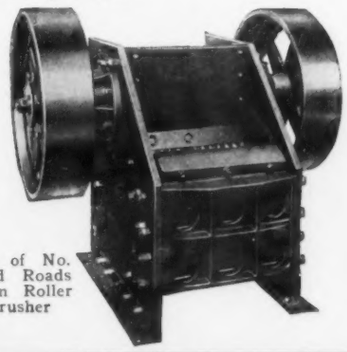
Offices in Principal Cities

Send for Vibrating Screen Book No. 1362 and Book No. 1240, "Equipment for Preparing Sand, Gravel, Stone by Link-Belt."

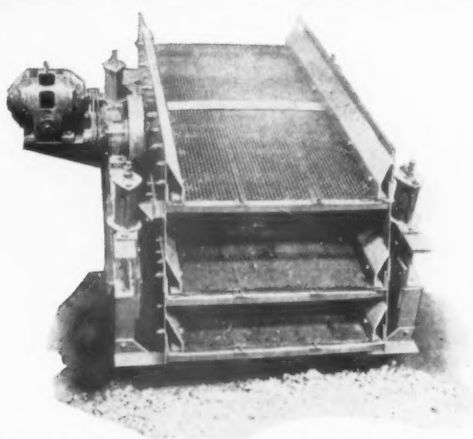
LINK-BELT *VIBRATING SCREEN*

CHAMPIONS
IN NAME AND PERFORMANCE

Good Roads Champion Roller Bearing Crushers are the most outstanding overhead eccentric type jaw crushers in the field today. The design embodies large jaw openings and long crushing dies or jaws, thus accomplishing a dual purpose for primary and secondary crushing with maximum efficiency in one single unit, whether feeding one-man stone or when the crusher is used for secondary reduction. One-man stone can be reduced in one operation to very small sizes and the capacity is unusually large with a low maintenance and operating cost, insuring the ultimate goal—low cost per ton.

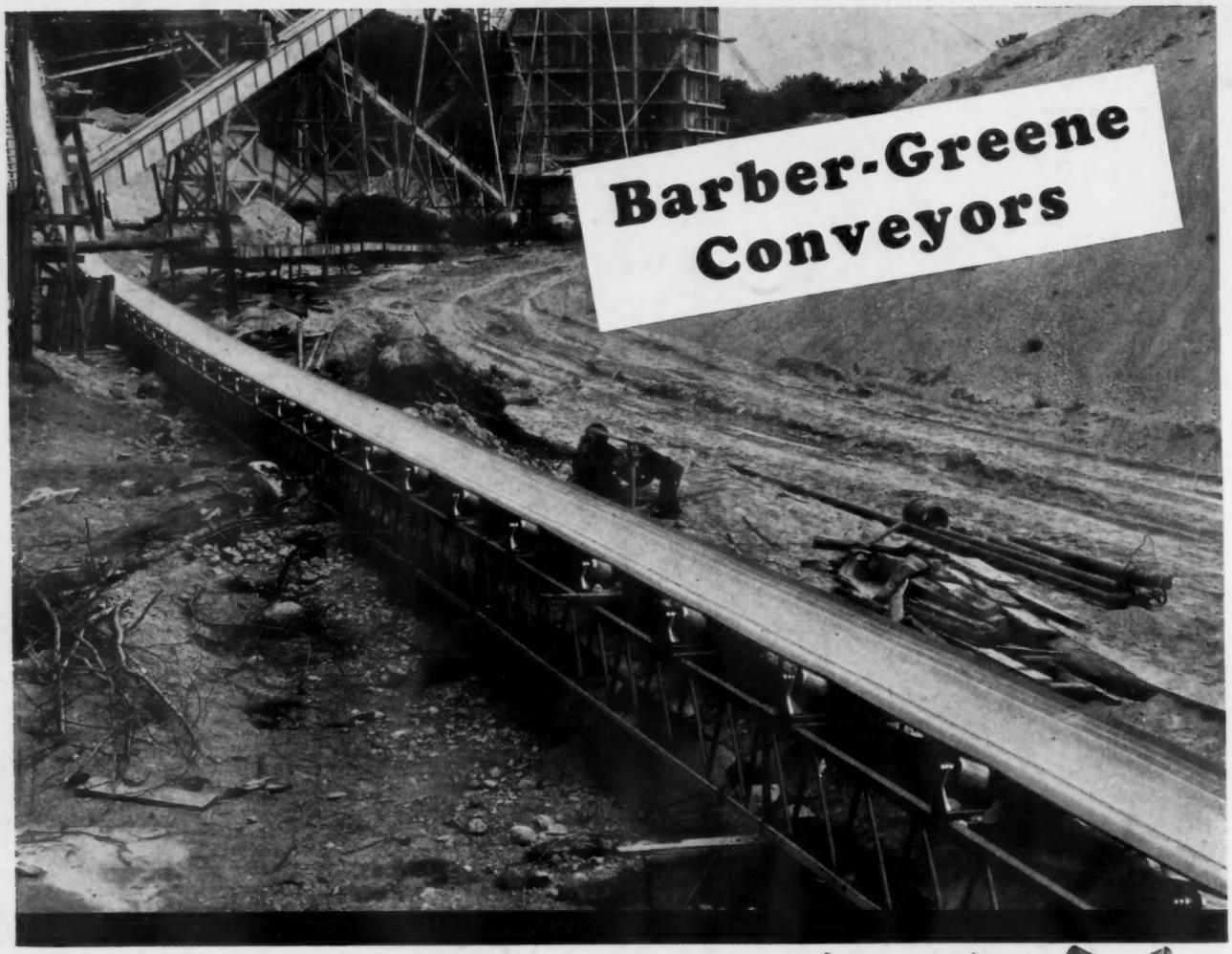


Front View of No. 1030, Good Roads Champion Roller Bearing Crusher



Good Roads Champion Vibrating Screens feature the use of patented cylindrical assemblies on each corner, providing for adjustment, and insuring perfect balance and maximum screening efficiency. The screen is of sturdy construction throughout, the main shaft being supported in heavy duty S K F roller bearings. Made in various sizes with one, two or three decks as required.

GOOD ROADS
MACHINERY CORP.
KENNETT SQUARE, PA.



Note the unique design of the new B-G Truss giving uniform rigidity in all directions. Warren-type lateral bracing as well as side trusses with common focal points, give a staggered paneling to the opposite sides. Note the focal points of struts and chords with six members meeting at each point.

Added to the many other exclusive Barber-Greene features comes the new B-G welded Truss, which will mean even more economies; more convenience, and portability; and greater range of application.

The B-G welded Truss, which is 30″ deep, will make longer spans, and longer over-hangs, thus eliminating many costly supports. Its rigid box section gives it the same great strength in all directions, making it easier to lift, and of course retaining its alignment when handled. Like all Barber-Greene Conveyors, the truss is made up of standardized sections so that it can be easily knocked down, easily transported, and easily erected. Whether your conveyor is to be erected permanently or must be changed to suit new conditions or new jobs, the B-G Truss will add materially to the many advantages of using belt conveyors.

Remember, B-G Standardized Conveyors are available in sizes to meet all normal requirements, with roller bearing, ball bearing, or plain bearing carriers, and with all necessary auxiliary equipment.

Quotations gladly submitted on complete installations, or any of the Barber-Greene parts. No obligation.

Standardized Material Handling Machines

BARBER GREENE

492 West Park Ave.

Aurora, Illinois